Workshop Manual
competence level 2

D 2011 w
TD 2011 w, TCD 2011 w

0312 4176 en

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DEUTZ®

The engine company.

1 Foreword

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- Read and observe the information in this documentation. You will avoid accidents, retain the manufacturer's warranty and possess a fully functional and ready to operate engine.
- This engine is built exclusively for purpose according to the scope of delivery - defined by the equipment manufacturer (use for the intended purpose). Any use above and beyond this is considered improper use. The manufacturer will not be liable for damages resulting from this. The user bears the sole risk.
- Use for the intended purpose also includes observance of the operating, maintenance and repair instructions specified by the manufacturer. The engine may only be used, maintained and repaired by persons who are familiar with this and are aware of the risks involved.
- Make sure that this documentation is available to everyone involved in the operation, maintenance and repair and that they have understood the contents.
- Failure to observe this documentation may lead to malfunctions and engine damage as well as injury to persons for which the manufacturer will not accept any liability.
- Prerequisite for proper maintenance and repair is the availability of all the necessary equipment, conventional and special tools and their perfect condition.
- Engine parts such as springs, clamps, elastic retaining rings etc. pose an increased risk of injury when handled incorrectly.
- The pertinent rules for the prevention of accidents and other generally recognised health and safety regulations must be observed.
- Maximum economy, reliability and long life is only guaranteed when using DEUTZ original parts.
- Repair of the engine must correspond to its use for the intended purpose. Only parts released by the manufacturer for the respective purpose may be used for conversion work. Unauthorised modifications to the engine exclude manufacturer liability for resulting damages. Failure to observe this will void the warranty!
- The engines made by DEUTZ are developed for a wide range of applications. A wide range of variants ensures that the respective special requirements are met.
- The engine is equipped according to the installation case, i.e. not all the parts and components described in this documentation are installed in your engine necessarily.
- We have done our best to highlight the differences so that you can easily find the operating, maintenance and repair instructions relevant to your engine.

We are at your service for any questions you may have in this matter.

Your DEUTZ AG

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2 General

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DEUTZ engines are the product of years of research and development. The profound expertise gained through this, in combination with high demands on quality, attests to the fact that our engines possess all the qualities of long life, high reliability and low fuel consumption. It goes without saying that the high environmental protection requirements are also met.

Maintenance and care are the only way the engine can satisfy the demands you make on it. Compliance with the prescribed maintenance times and the careful execution of maintenance and care work are therefore essential. Difficult operating conditions, deviating from normal operation, must be particularly heeded.

Please consult one of our service representatives responsible for operating faults and spare parts questions. Our trained specialist personnel ensures fast and professional repairs using original DEUTZ spare parts in the event of damage.
Original spare parts from DEUTZ AG are always manufactured according to the state of the art.

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3 User notes

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3.1 General

The documentation of the workshop manual has been created based on the engine available at the time of going to press.
There may be deviations in the descriptions, illustrations and parts due to further developments.

The maintenance work described in the operation manual and in the workshop manual must be carried out on schedule and completely. The maintenance personnel must have the necessary technical knowledge to perform the work. Safety and protection devices which are removed during maintenance work must be replaced again afterwards.

Caution!

The rules for the prevention of accidents and the safety regulations must be observed during maintenance work.

Reference is made in the workshop manual job cards to the regulations in chapter 3.2. These must be read before working on the engine and must be strictly followed.

The maintenance intervals and the work to be performed are specified in the maintenance schedule of the operation manual. The job cards contain technical documentation on the execution of maintenance work.

3.2 Specifications

3.2.1 Accident prevention and safety regulations

The legally prescribed rules for the prevention of accidents must be observed. These are available from professional associations or from dealers. These are dependent on the application site, operating mode and the operating and auxiliary materials being used.

Special protection measures are specified depending on the work being carried out, and are identified in the job description.

Among other things it generally applies that:

- for the personnel:
  - Only briefed personnel may operate or maintain the engine. Unauthorised persons are prohibited access to the machine room.
  - Wear close-fitting clothing and ear protectors in the machine room when the engine is in operation.
  - Only deploy trained personnel to do repairs and maintenance work.
  - Do not work on the fuel system when the engine is running. The fuel system is under high pressure - danger of death.
  - Go to the workshop immediately in case of leaks in the fuel system.
- for the engine room:
  - Ensure adequate ventilation (do not cover air shafts).
  - Provide first aid kit and suitable fire extinguishers. Check the filling and readiness for operation regularly.
  - Only store inflammable materials in the machine room if they are essential for operation of the system.
  - Smoking and naked flames are prohibited in the machine room.
- for operation, maintenance and repairs on the engine:
  - Wait 30 seconds after switching off the engine before working on the fuel sytem.
  - After all work on the fuel system, it must be bleeded - see the operation manual, chapter "6 Fuel system“.
  - Only start the engine when all the protective devices have been fitted. Make sure no-one is standing in the danger area.
  - Cleaning, maintenance and repair work may only be performed with the engine at a standstill and secured against starting.
  - Injection lines and high pressure pipes must not be deformed.

- Damaged injection lines and high-pressure pipes must be renewed.
- Injection lines and high pressure fuel lines must never be connected when the engine is running.
- Do not place hands near to a leak in the high pressure fuel system.
- Also carefully check all high pressure components visually before performing tests on the running engine. Wear suitable protective clothing (for example protective glasses). Leaks are a potential source of danger for workshop personnel.
- Even if no leaks are discernible on the high pressure fuel system, the workshop personnel should avoid the immediate danger zone or wear suitable protective clothing (such as protective glasses) when performing tests on the running engine and during the first trial run.
- Always stay out of range of a fuel jet, as it could cause severe injury.
- Smoking is strictly prohibited when working on the fuel system.
- Do not work near to sparks and flames.
- Never disconnect an injector when the engine is running.

3.2.2 Cleanliness instructions and measures for handling the DEUTZ Common Rail System

The DEUTZ Common Rail system used in the DEUTZ engines consists of high-precision components which are exposed to extreme stress. Great attention must be paid to cleanliness when working on the fuel system due to the high precision technology.

Notes and measures to be observed before starting work on the fuel system

- The fuel system must be closed. Make a visual inspection for leaks / damage to the fuel system.
- Clean the whole engine and engine room with the system closed before starting work on the fuel system.
- The engine must be dry when you start working on the fuel system.
- Blowing (dry) with compressed air is only permissible with the fuel system closed.
- When using a steam jet, first cover up the control unit, the cable plugs, all other electrical plug connections and the generator. Also, the steam jet may not be pointed directly at them.
- Electrical plug connections must be plugged when spraying.
- Remove loose parts (for example paint chips from assembly work) with an industrial vacuum cleaner or other suction device. Only suction may be used in assembly work on the open fuel system.
- Only work on the fuel system in a clean environment (no dust, no grinding or welding). Avoid draughts (dust). Clean the workshop floor regularly. No brake or performance test benches may be kept or operated in the same room.
- Air currents which kick up dust, such as those caused by brake repairs or the starting of engines, should be avoided.
- For work such as removal and installation on defective hydraulic components on the Common Rail System it is recommended to partition off a separate workshop area in the factory. This must be separate from other areas in which general vehicle repairs such as brake repairs are carried out.
- No general machine tools may be operated in this room.
- Regular cleaning of the workshop area is mandatory. Draughts, ventilation systems and heating fans should be minimised.
- Areas of the engine room from which particles of dirt could be loosened (for example the bottom part of the tipped driver cab) must be covered with fresh clean film.
- Working materials and tools must be cleaned before work. Only use tools without damage to the chrome plating or tools which are not chrome-plated.

Notes and measures to be observed during work on the fuel system or with the fuel system open.

- Only work in clean overalls.
- Only lint-free cleaning cloths may be used for work on the fuel system.
- Remove loose parts (for example paint chips from assembly work) with an industrial vacuum cleaner or other suction device. Only suction may be used in assembly work on the open fuel system.
- Working materials and tools must be cleaned before work. Only use tools without damage to the chrome plating or tools which are not chrome-plated.
- Do not use used cleaning fluid or test fluid for cleaning.
- Compressed air must not be used for cleaning on the open fuel system.
- Work on removed components may only be performed at a suitably equipped workbench.

- When removing and installing components, no materials which can leave behind particles or fibres (cardboard, wood, cloths) may be used.
- Removed parts may only be rubbed down with clean, lint-free cloths. No dirt particles may be rubbed into the components.
- Openings on the components and on the engine must be closed immediately with suitable stoppers/caps.
- The stoppers/caps may only be removed immediately before installing.
- Store stoppers/caps free from dust and dirt in the original packaging and dispose of after using once.
- Only remove new parts from the original packaging just before installation.
- Removed components must be kept in new, sealable bags or - if available - in the packaging of the new parts.
- Always use the original packaging of the new part to send back the removed components.

Notes and measures for the vehicle workshop area

- For work such as removal and installation on defective hydraulic components on the Common Rail System it is recommended to partition off a separate workshop area in the factory. This must be separate from other areas in which general vehicle repairs such as brake repairs are carried out.
- The workshop floor is sealed or tiled.
- No welding gear, grinders, general machine tools, brakes or performance test benches may be operated in this room.
- Regular cleaning of the workshop area is mandatory. Draughts, ventilation systems and heating fans should be minimised.

Notes and measures for workbench and tools in the vehicle hall

- A special workbench must be set up for work on removed components.
- Clean the removal and installation tools regularly and keep them in a closed tool cabinet.
- Remove loose parts (for example paint chips from assembly work) with an industrial vacuum cleaner or other suction device.
- Working materials and tools must be cleaned before work. Only use tools without damage to the chrome plating or tools which are not chrome-plated.

3.2.3 Disposal regulations

The work described in the operation manual and workshop manual necessitates renewal of parts and operating materials among other things. The renewed parts / operating materials must be stored, transported and disposed of according to regulations. The owner himself is responsible for this.

Disposal includes recycling and the scrapping of parts / operating materials, although recycling has priority.

Details of disposal and their monitoring are governed by regional, national and international laws and directives which the system operator must observe on his own responsibility.

3.3 Operation manual and workshop manual

To structure the information to suit the user, the service documentation is divided into operation manual and workshop manual.

The operation manual contains a general description and instructions for all other maintenance work.

It contains the following chapters:

1. Contents, General
2. Engine description
3. Operation
4. Operating media
5. Maintenance
6. Care and maintenance work
7. Faults, causes and remedies
8. Engine conservation
9. Technical data
10. Service

The workshop manual assumes knowledge of the contents of the operation manual. This applies especially for the safety regulations. The workshop manual describes repairs to the engine and components for which more effort and appropriately qualified technicians are required.

3.4 Job cards

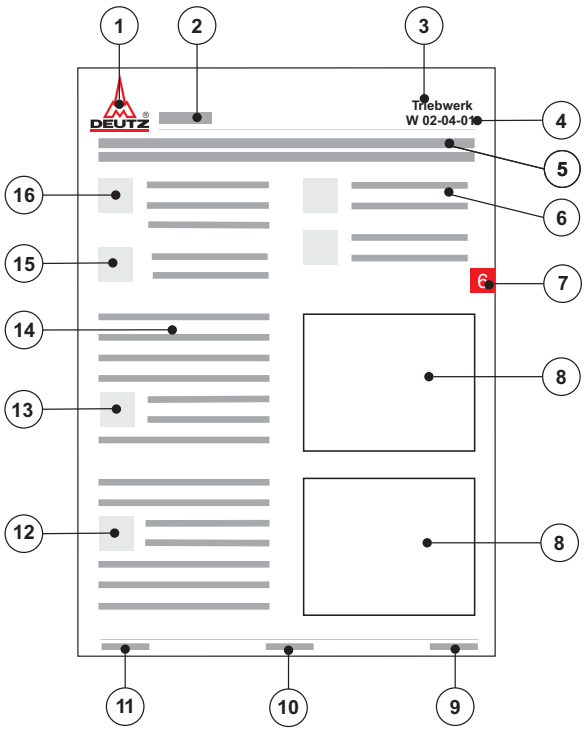
The job cards are divided in the workshop manual into "W" and "I" job cards.
The "W" job card documents standard repairs on the engine and/or its components. The necessary tools and special tools are also specified in the "W" job card.
The "I" job card additionally documents the appropriate work procedures for repairing the engine and/or its components. The workshop must satisfy special conditions to perform these work procedures. Special tools and machine tools must be available, for example.

3.4.1 Numbering of job cards

The job card numbers follow the pattern **W 02-04-01**. The individual parts of this pattern are explained below:

- **W** 02-04-01: Documentation type
  - **W**Workshop manual
  - I ..... Repair instructions
- W **02**-04-01: Maintenance group
  - 00 ... General / interdisciplinary activities
  - 01 ... Cylinder head
  - **02**Drive system
  - 03 ... Crankcase
  - 04 ... Engine control system
  - 05 ... Speed governing
  - 06 ... Exhaust system / Charging
  - 07 ... Fuel system
  - 08 ... Lube oil system
  - 09 ... Cooling system
  - 10 ... Compressed air system
  - 11 ... Monitoring system
  - 12 ... Other components
  - 13 ... Electrical system
- W 02-**04**-01: Component grouping
- W 02-04-**01**: Consecutive number

3.4.2 Structure of a job card



1. DEUTZ AG, publisher of service documentation
2. Engine type (e.g. TCD 2013 4V)
3. Maintenance group
4. Job card number or topic
5. Title of job card
6. Reference to other job cards
7. Chapter
8. Graphic or photo
9. DEUTZ internal creation number
10. Page number
11. Date of issue of job card
12. Note
13. Danger / Important
14. Work sequence
15. Special tools; auxiliary materials
16. Conventional tools

3.5 Explanation of symbols

Danger!
of death or to health. Must be observed!
For example: The incorrect use or conversion of the turbocharger can lead to serious injury.

Caution!
Danger to the component/engine. Non-compliance can lead to destruction of the component/engine.
Must be observed!

Note
General notes on assembly, environmental protection etc. No potential danger for man or machine.

Tool
Conventional and special tools required for the work.

Auxiliary materials
Working materials required in addition to the tools for performing the work
(e.g. greases, oils, adhesives, sealants)

References
to important documents or job cards for the work process.
For example: Job card W 04-05-05

Reference
to a document or a job card within the work process.

Test and setting data
The necessary values are specified here.
If several values are necessary, a cross reference is given to the Test and Setting Values table.
For example:
ID no. P01 61 = valve clearance, inlet

Tightening specification
The necessary values are specified here.
If several values are necessary, a cross reference is given to the Tightening Specifications table.
For example:
ID no. A01 001 = cylinder head screws

4 Technical data

4.1 Testing and setting data

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ID no.	Name	Additional information	Value
D 2011 w / TD 2011 w / TCD 2011 w			
P00 04	Engine weight according to DIN 70020-A		approx. 268 kg
P00 51	Compression pressure		25 - 30 bar (2500 - 3000 kPa)
P00 71	Ignition sequence		1-3-4-2
P01 61	Valve clearance (inlet)		0.3 mm
P01 62	Valve clearance (outlet)		0.5 mm
P01 72	Rocker arm, bore, diameter (outlet)		$18^{+0.27}$ mm
P01 73	Rocker arm, bore, diameter (inlet)		$18^{+0.27}$ mm
P01 74	Rocker arm pin, diameter		$17{,}97^{+0.01}_{-0.01}$ mm
P02 75	Piston overhang	Identification, cylinder head gasket = 1 recess	0.325 - 0.604 mm
P02 76	Piston overhang	Identification, cylinder head gasket = 2 recesses	0.605 - 0.704 mm
P02 77	Piston overhang	Identification, cylinder head gasket = 3 recesses	0.705 - 0.804 mm
P08 74	Thermostat, compression spring, length		45.7 mm
P09 11	Thermostat, start of opening		86 - 90 °C
P09 13	Thermostat, stroke distance		at least 9 mm
P12 11	V-belt tension, individual V-belts AVX 10	First assembly	450^{+50}_{-50} N
P12 21	V-belt tension, individual V-belts AVX 10	Check after 15 minutes running under load	300^{+20}_{-20} N
D 2011 w / TD 2011 w / TCD 2011 w Recess cylinder head			
P02 75	Piston overhang	Identification, cylinder head gasket = 1 recess	9.820 - 10.140 mm
P02 76	Piston overhang	Identification, cylinder head gasket = 2 recesses	10.141 - 10.239 mm
P02 77	Piston overhang	Identification, cylinder head gasket = 3 recesses	10.240 - 10.310 mm

4.2 Tightening specifications

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ID no.	Name	Screw type	Notes / Remark	Value
D 2011 w / TD 2011 w / TCD 2011 w				
A00 001	Clamping bracket on crankcase			90 Nm
A00 002	Clamping bracket on adapter for assembly block			90 Nm
A00 003	Mounting foot/engine mounting on crankcase	M14x55-12.9 M14x100-12.9		200 Nm
A01 001	Cylinder head on crankcase		Stage 1: Cylinder head screws can be used a maximum of 3x with written documentation. Otherwise use new cylinder head screws. Observe tightening sequence.	30 Nm
A01 001	Cylinder head on crankcase		Stage 2	80 Nm
A01 001	Cylinder head on crankcase		Stage 3	160 Nm
A01 001	Cylinder head on crankcase		Stage 4	90°
A01 002	Rocker arm bracket on cylinder head			21 Nm
A01 003	Locking nut, valve adjuster			20 Nm
A01 004	Cylinder head cover on cylinder head			8.5 Nm
A03 060	Crankcase bleeding on front cover / on cylinder head cover / on cylinder head			8.5 Nm
A05 041	Lifting magnet (engine shutdown) on front cover			8.5 Nm
A05 065	Lifting magnet (start amount release) on front cover			10 Nm
A06 001	Exhaust pipe at cylinder head	Torx screw, coated	Use new screws.	55 Nm
A07 001	Fuel injector on cylinder head			21 Nm
A07 003	Injection line on fuel injector / injection pump	M12x1.5		25 Nm
A07 015	Fuel supply line to injection pump	Hollow screw	Replace sealing rings	29 Nm
A07 024	Fuel supply pump on crankcase			21 Nm
A07 061	Fuel return line on injection pump	Hollow screw	Replace sealing rings	29 Nm
A08 003	Oil filter console on crankcase	Torx M8x50-8.8 Torx M8x90-8.8		21 Nm
A08 048	Control line to oil filter console / crankcase	Hollow screw M10x1		18 Nm
A08 051	Lubricating oil cooler on oil filter console	M6x16-10.9		13 Nm
A08 072	Thermostat on crankcase, locking screw,			90 Nm
A08 091	Oil pressure switch on crankcase	M10x1		13 Nm
A09 001	Thermostat housing to crankcase	M8x100-10.9		34 Nm
A09 002	Outlet nozzles on thermostat housing	M8x30-10.9		22 Nm

ID no.	Name	Screw type	Notes / Remark	Value
A09 010	Coolant pump on thermostat housing	M8x35-10.9 M8x100-10.9		20 Nm
A09 020	Pipe clip on holder	M6x16		21 Nm
A09 031	Temperature transmitter on thermo-stat housing			25 Nm
A09 042	Ventilator on flange hub	M8x40-10.9		30 Nm
A09 045	Air bearing on console	M10x110-12.9	Stage 1: Use new screw.	30 Nm
A09 045	Air bearing on console	M10x110-12.9	Stage 2:	120°
A12 001	Flywheel on crankshaft		Stage 1: Use new screws	30 Nm
A12 001	Flywheel on crankshaft		Stage 2:	60°
A12 001	Flywheel on crankshaft		Stage 3:	30°
A12 031	V belt pulley/flange hub on output flange	M10x30-8.8		43 Nm
A12 041	V-belt tensioning pulley (holder) on front cover			45 Nm
A12 051	Hydraulic pump on hydraulic pump console			57 Nm
A12 052	Tensioning pulley on hydraulic pump console			21 Nm
A12 056	Protective hood on hydraulic pump console			8.5 Nm
A13 001	Starter on crankcase			43.5 Nm
A13 009	Shield on crankcase	M6x14-8.8		8.5 Nm
A13 012	Generator on console	M8x70-10.9 M8x75-10.9		34 Nm
A13 015	Clamping bracket on generator	M8x30-8.8		22 Nm
A13 016	Clamping bracket on console	M8x35-8.8		22 Nm
A13 031	Glow plug in charge air line / intake pipe			60 Nm
A13 032	Heating plug on cylinder head			21 Nm
A13 034	Cable connection to glow plug			4 Nm
A13 081	Charging current cable to generator B+			6.5 Nm
A13 082	Cable G1.D+ to generator	M5		3.5 Nm
D 2011 w				
A06 030	Air suction intake pipe on cylinder head	Torx screw, coated	Use new screws.	21 Nm
A06 057	Pipe to exhaust gas return valve/ cylinder head (cooling - intake)	Hollow screw M12x1.5		29 Nm
A06 062	Exhaust return pipe to exhaust return valve	M8x65-10.9		20 Nm
A06 063	Exhaust gas collection pipe to exhaust gas return valve			20 Nm
A06 071	Pipe to crankcase (exhaust gas return - cooling - return)	Hollow screw M8x1		12 Nm
A06 072	Pipe to exhaust gas return valve (exhaust gas return - cooling - return)	Hollow screw M12x1.5		29 Nm

ID no.	Name	Screw type	Notes / Remark	Value
A06 073	Exhaust gas collection pipe (exhaust gas return) on cylinder head	Torx M10x25-10.9 Torx M10x30-10.9 Torx M10x45-10.9	Use new screws.	55 Nm
A06 074	Exhaust gas return pipe to cylinder head (exhaust gas return)			8.5 Nm
A06 075	Safety cover on sensor housing (exhaust gas return)	Locking screw Torx-Plus 30IPR		8 Nm
A07 087	Fuel filter console to crankcase			21 Nm
TD 2011 w / TCD 2011 w				
A06 004	Pin bolts on exhaust pipe	coated	Use new pin bolts	12 Nm
A06 020	Turbocharger on exhaust pipe	M8		21 Nm
A06 030	Charge air pipe on cylinder head	Torx screw, coated	Use new screws.	21 Nm
A06 094	Lifting magnet on fuel filter console		Renew O-ring	10 Nm
A07 096	Cap on charge air-dependent full load stop			8 Nm
A08 042	Lubricating oil pipe on turbocharger / crankcase	Hollow screw	Replace sealing rings	29 Nm
A08 044	Oil return line, hex spuds to turbocharger	M16x1.5	Use new sealing ring	40 Nm
A08 049	Holder oil return line on crankcase	Torx, M6x14-8.8		8.5 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

5 Job card overview

5.1 Sorted alphabetically

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Activity	Job card	Maintenance group
Checking piston overhang	W 01-04-09	Cylinder head
Checking the compression pressure	W 00-02-06	General
Checking the thermostat (in the removed state)	W 09-08-01	Cooling system
Disassembling, assembling and checking the rocker arm and rocker arm bracket	W 01-02-06	Cylinder head
Installing and removing charge air pressure-dependent full load stop	W 07-10-08	Fuel system
Mounting engine on assembly block and demounting	W 00-05-01	General
Removing and install the charge air line	W 06-02-03	Exhaust system/Charging
Removing and installing cylinder head	W 01-04-04	Cylinder head
Removing and installing fuel pipes	W 07-10-06	Fuel system
Removing and installing temperature transmitter	W 09-12-01	Cooling system
Removing and installing the control line	W 08-16-01	Lube oil system
Removing and installing the coolant pump	W 09-07-08	Cooling system
Removing and installing the crankcase bleeding	W 03-01-11	Crankcase
Removing and installing the exhaust gas collection pipe (Exhaust gas recirculation)	W 06-09-08	Exhaust system/Charging
Removing and installing the exhaust gas return pipe	W 06-09-07	Exhaust system/Charging
Removing and installing the exhaust gas return valve	W 06-09-06	Exhaust system/Charging
Removing and installing the exhaust line	W 06-01-05	Exhaust system/Charging
Removing and installing the flywheel	W 12-06-01	Other components
Removing and installing the fuel filter console	W 07-10-08	Fuel system
Removing and installing the fuel injectors	W 07-07-01	Fuel system
Removing and installing the fuel supply pump	W 07-11-01	Fuel system
Removing and installing the generator	W 13-02-03	Electrical system
Removing and installing the glow plug	W 13-06-02	Electrical system
Removing and installing the heating plugs	W 13-06-01	Electrical system
Removing and installing the hydraulic pump	W 12-08-02	Other components
Removing and installing the intake manifold	W 06-07-03	Exhaust system/Charging
Removing and installing the lifting magnet (charge air pressure-dependent full load stop)	W 07-10-08	Fuel system
Removing and installing the lifting magnet (Engine shutdown)	W 11-00-03	Monitoring system
Removing and installing the lifting magnet (Start amount release)	W 07-02-07	Fuel system
Removing and installing the lubricating oil cooler	W 08-08-02	Lube oil system

Activity	Job card	Maintenance group
Removing and installing the oil filter console	W 08-11-07	Lube oil system
Removing and installing the oil pressure switch	W 08-11-08	Lube oil system
Removing and installing the rocker arm and rocker arm bracket	W 01-02-02	Cylinder head
Removing and installing the starter	W 13-03-02	Electrical system
Removing and installing the thermostat	W 09-08-02	Cooling system
Removing and installing the thermostat (Lubricating oil cooler)	W 08-11-12	Lube oil system
Removing and installing the thermostat housing	W 09-08-04	Cooling system
Removing and installing the turbocharger	W 06-06-04	Exhaust system/Charging
Removing and installing the V-belt pulley	W 12-01-04	Other components
Renew V-belts, check V-belt tension	W 12-02-01	Other components
Renewing the injection lines	W 07-03-01	Fuel system
Setting valve clearance	W 01-01-01	Cylinder head

5.2 Sorted numerically

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Job card	Activity	Maintenance group
W 00-02-06	Checking the compression pressure	General
W 00-05-01	Mounting engine on assembly block and demounting	General
W 01-01-01	Setting valve clearance	Cylinder head
W 01-02-02	Removing and installing the rocker arm and rocker arm bracket	Cylinder head
W 01-02-06	Disassembling, assembling and checking the rocker arm and rocker arm bracket	Cylinder head
W 01-04-04	Removing and installing cylinder head	Cylinder head
W 01-04-09	Checking piston overhang	Cylinder head
W 03-01-11	Removing and installing the crankcase bleeding	Crankcase
W 06-01-05	Removing and installing the exhaust line	Exhaust system/Charging
W 06-02-03	Removing and install the charge air line	Exhaust system/Charging
W 06-06-04	Removing and installing the turbocharger	Exhaust system/Charging
W 06-07-03	Removing and installing the intake manifold	Exhaust system/Charging
W 06-09-06	Removing and installing the exhaust gas return valve	Exhaust system/Charging
W 06-09-07	Removing and installing the exhaust gas return pipe	Exhaust system/Charging
W 06-09-08	Removing and installing the exhaust gas collection pipe (Exhaust gas recirculation)	Exhaust system/Charging
W 07-02-07	Removing and installing the lifting magnet (Start amount release)	Fuel system
W 07-03-01	Renewing the injection lines	Fuel system
W 07-07-01	Removing and installing the fuel injectors	Fuel system
W 07-10-06	Removing and installing fuel pipes	Fuel system
W 07-10-08	Removing and installing the lifting magnet (charge air pressure-dependent full load stop)	Fuel system
W 07-10-08	Installing and removing charge air pressure-dependent full load stop	Fuel system
W 07-10-08	Removing and installing the fuel filter console	Fuel system
W 07-11-01	Removing and installing the fuel supply pump	Fuel system
W 08-08-02	Removing and installing the lubricating oil cooler	Lube oil system
W 08-11-07	Removing and installing the oil filter console	Lube oil system
W 08-11-08	Removing and installing the oil pressure switch	Lube oil system
W 08-11-12	Removing and installing the thermostat (Lubricating oil cooler)	Lube oil system
W 08-16-01	Removing and installing the control line	Lube oil system
W 09-07-08	Removing and installing the coolant pump	Cooling system

Job card	Activity	Maintenance group
W 09-08-01	Checking the thermostat (in the removed state)	Cooling system
W 09-08-02	Removing and installing the thermostat	Cooling system
W 09-08-04	Removing and installing the thermostat housing	Cooling system
W 09-12-01	Removing and installing temperature transmitter	Cooling system
W 11-00-03	Removing and installing the lifting magnet (Engine shutdown)	Monitoring system
W 12-01-04	Removing and installing the V-belt pulley	Other components
W 12-02-01	Renew V-belts, check V-belt tension	Other components
W 12-06-01	Removing and installing the flywheel	Other components
W 12-08-02	Removing and installing the hydraulic pump	Other components
W 13-02-03	Removing and installing the generator	Electrical system
W 13-03-02	Removing and installing the starter	Electrical system
W 13-06-01	Removing and installing the heating plugs	Electrical system
W 13-06-02	Removing and installing the glow plug	Electrical system

6 Job cards

6

Checking the compression pressure

Commercial available tools:
– Compression pressure tester 8005

Special tools:
– Connector 100120

– W 01-01-01
– W 07-07-01

Attention!
Pay attention to utmost cleanliness when working on the fuel system.
Remove residue paint and particles of dirt before removing.
Clean the respective affected parts carefully. Blow damp areas dry with compressed air.
Observe the safety regulations and national specifications for handling fuels.
Close all connections immediately after opening with new, clean plugs/caps.
Do not remove plugs/caps until immediately before assembling.
Collect leaking operating substances in suitable vessels and dispose of according to regulations.
After all work on the fuel system, it must be bleeded - see the operation manual, chapter "6 Fuel system".

Checking the compression pressure

- Set valve clearance.

  W 01-01-01

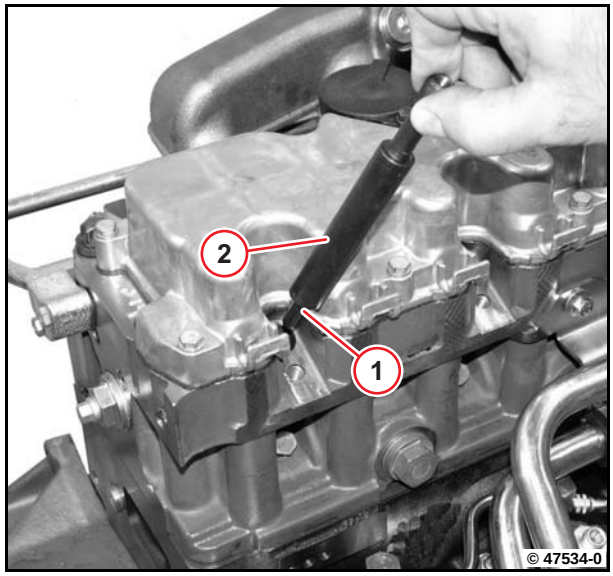
- Removing fuel injectors.

  W 07-07-01

- Mount sealing ring (1).

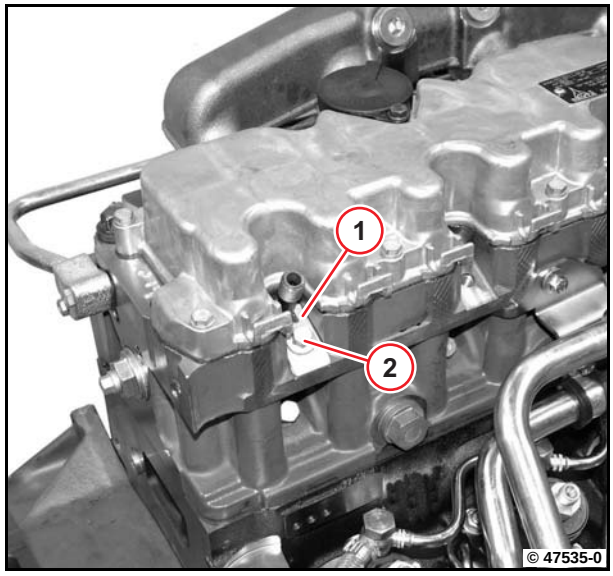
  Use sealing ring (1) for fuel injector.

- Insert connector (2).



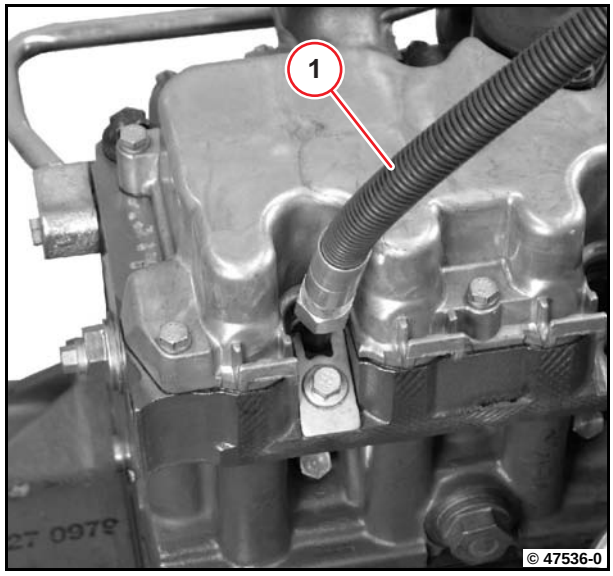
- Mount clamping shoe (1).
- Tighten screw (2).

21 Nm



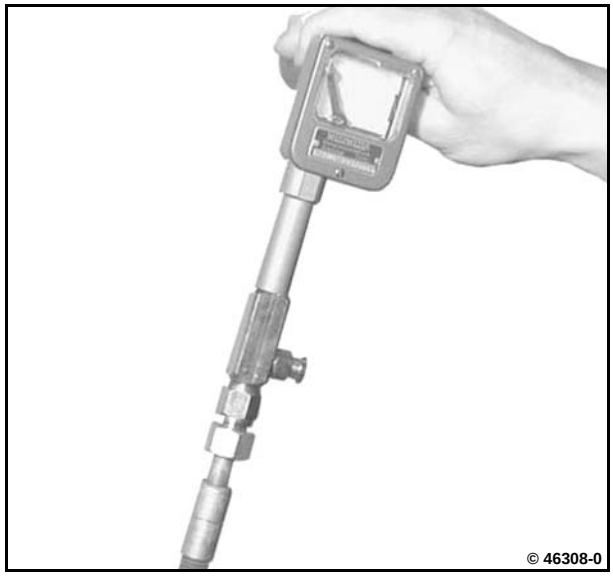
6

- Connect adapter (1) to connector.

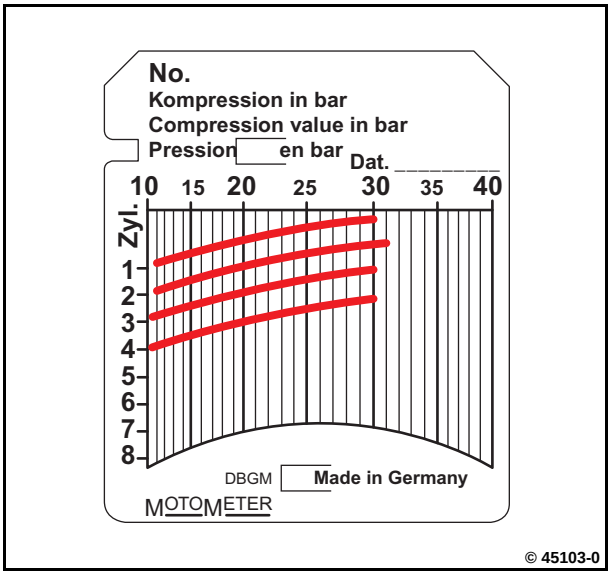


- Mount the compression tester on the adapter.
- Turn over engine with starter.

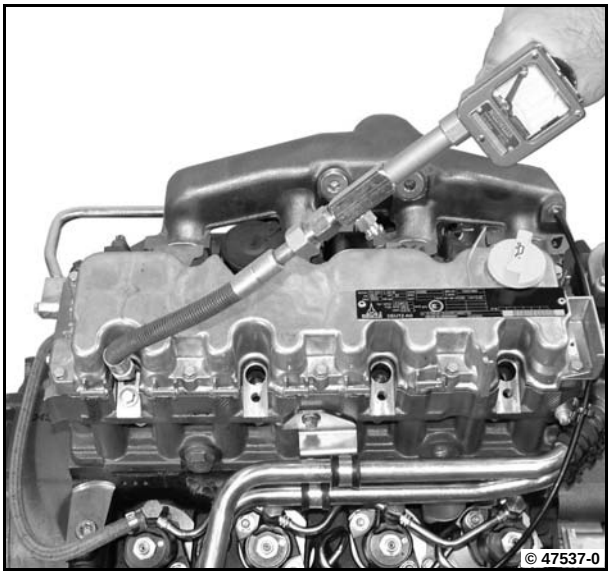
25 - 30 bar (2500 - 3000 kPa)



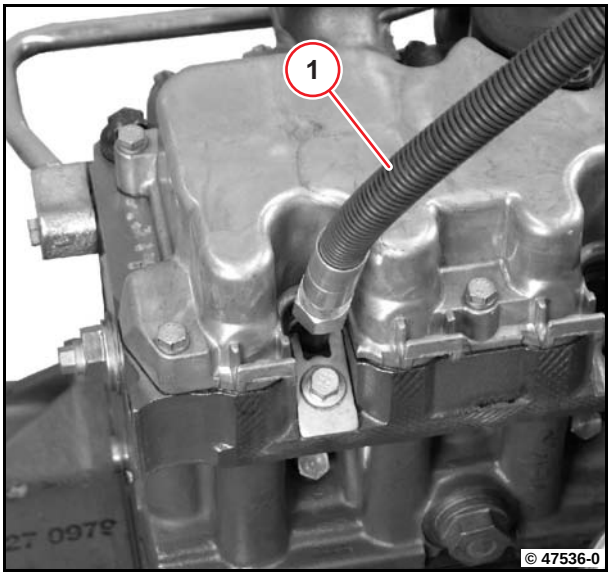
The measured compression pressure depends on the starting speed during the measuring process and the altitude of the engine installation site. Therefore, limit values cannot be determined exactly. The compression pressure measurement is only recommended as a reference measurement of all cylinders of an engine to each other. If more than 15% deviation has been determined, the cause should be determined by disassembling the cylinder unit concerned.



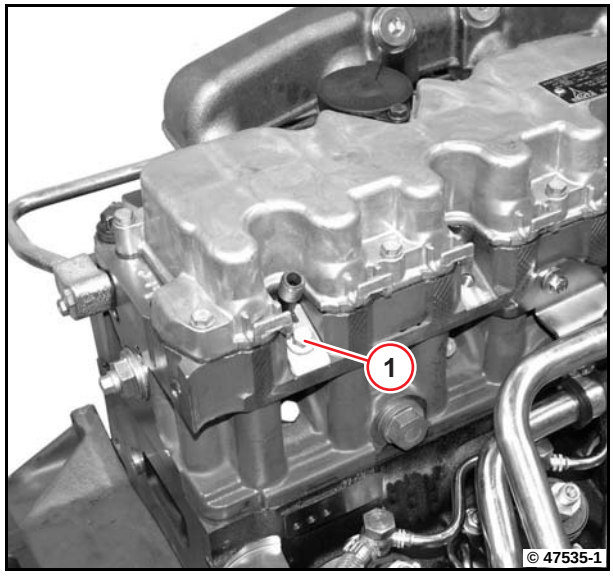
- Remove the compression pressure tester.



- Remove the compression pressure tester and adapter (1).

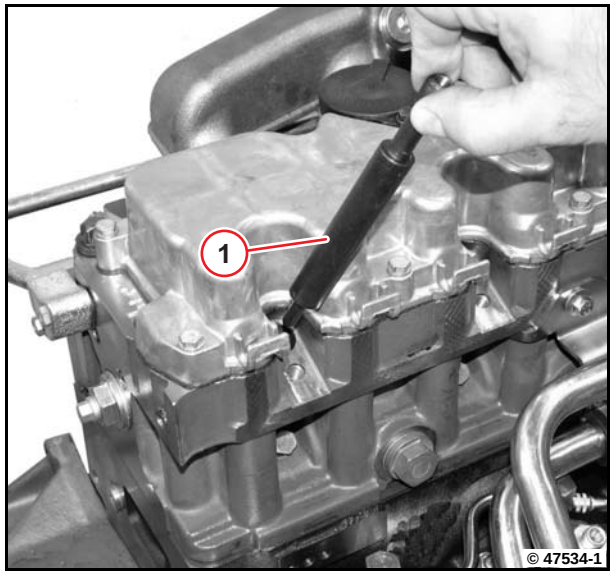


- Unscrew screw (1).



- Remove connector (1).
- Remove sealing ring.
- Install fuel injectors.

W 07-07-01



Technical Data

Testing and setting data

ID no.	Name	Additional information	Value
P00 51	Compression pressure		25 - 30 bar (2500 - 3000 kPa)

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A07 001	Fuel injector on cylinder head			21 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

Mounting engine on assembly block and demounting

Commercial available tools:
– Lifting gear
– Suspension ropes
– Eyelet bolts

Special tools:
– Assembly block. 6067
– Supporting bracket 6067/114
– Clamping bracket 6067/115

– W 13-03-02

Danger!

When using hoists (workshop crane) the safety regulations for handling hoists must be observed.
It is not permitted to stay under moving loads.

Different customer scopes are not taken into account in the repair sequence shown here, accessories which deviate from the standard equipment are not shown.

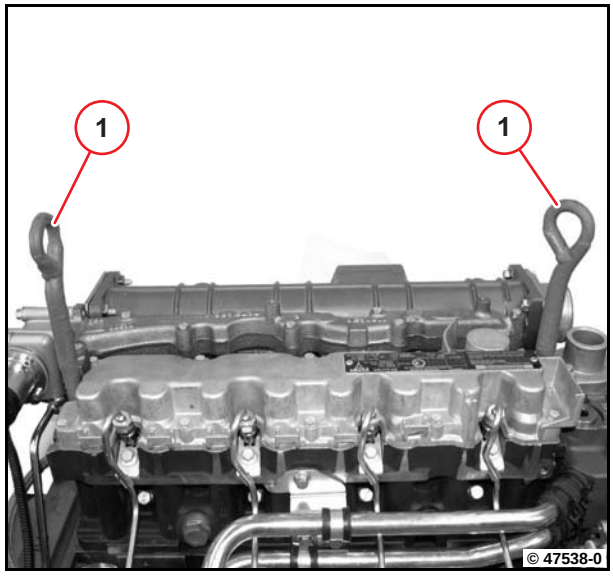
6

Mounting engine on assembly block

- Remove starter.

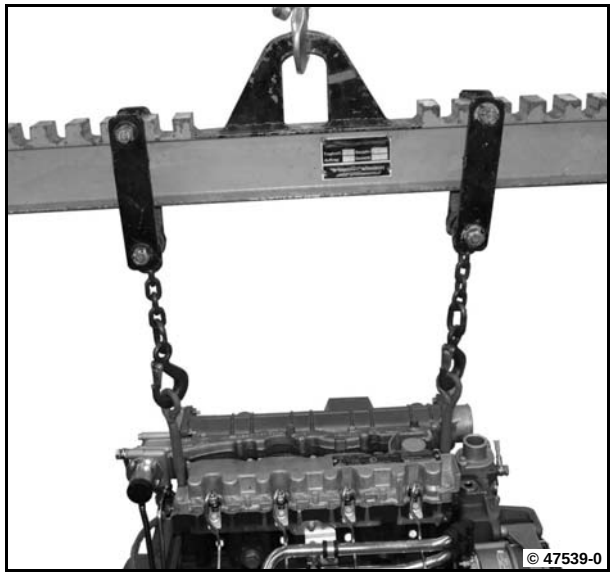
  W 13-03-02

- Screw in eyelet bolts (1).

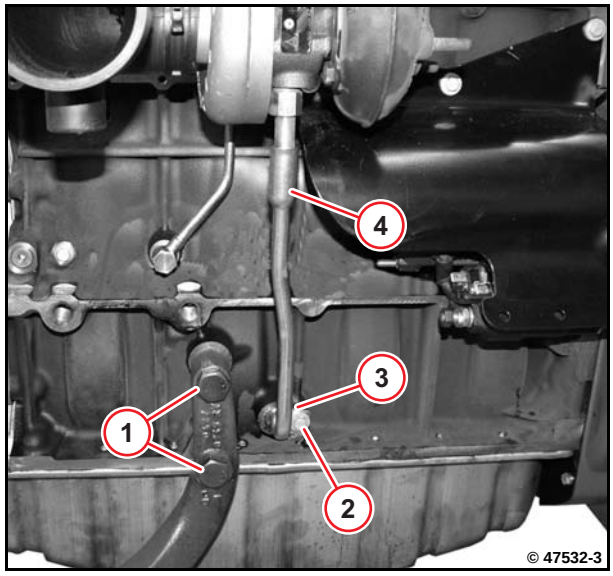


- Hang engine on workshop crane.

  approx. 268 kg

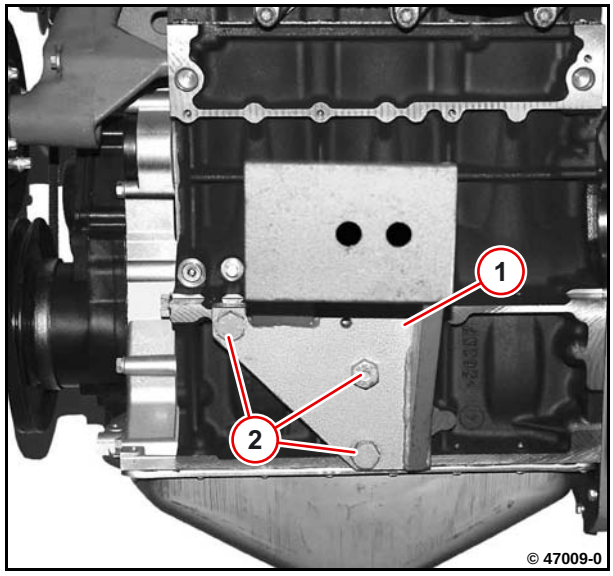


- Unscrew screws (1).
- Remove all mounting feet.
  – **TD 2011 w, TCD 2011 w**
- Unscrew screw (2).
- Remove holder (3).
- Remove oil return pipe (4).



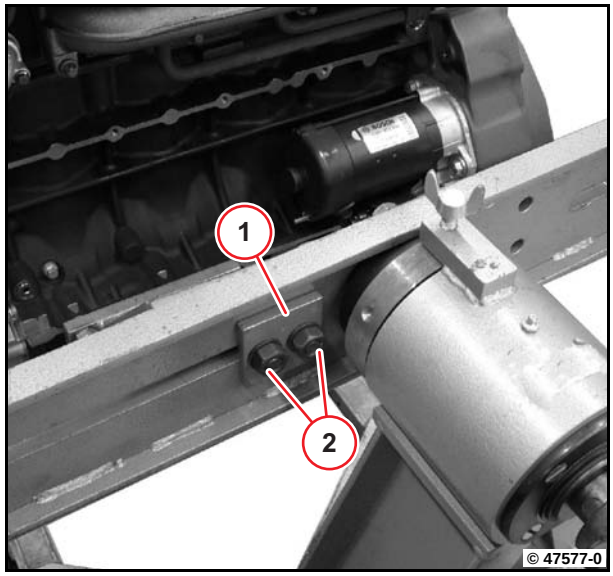
- Mount clamping holder (1).
- Tighten screws (2).

90 Nm

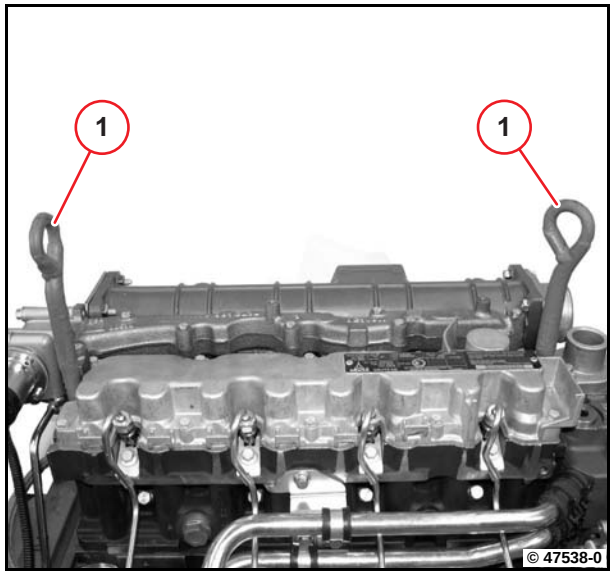


- Align engine on engine block.
- Mount retainer plate (1).
- Tighten screws (2) and lock nuts.

90 Nm



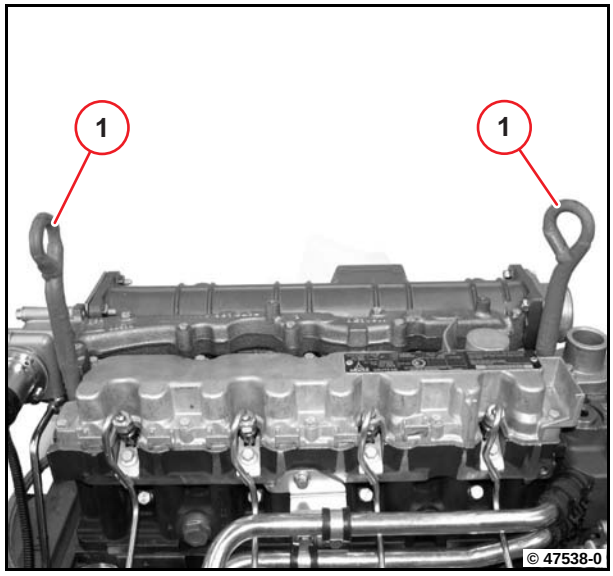
- Unhook the engine from the workshop crane.
- Unscrew eyelet bolts (1).



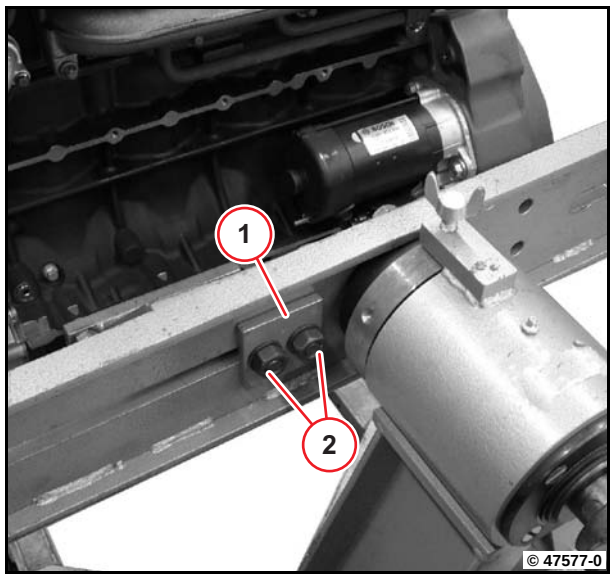
Demounting engine from assembly block

- Screw in eyelet bolts (1).
- Hang engine on workshop crane.

approx. 268 kg

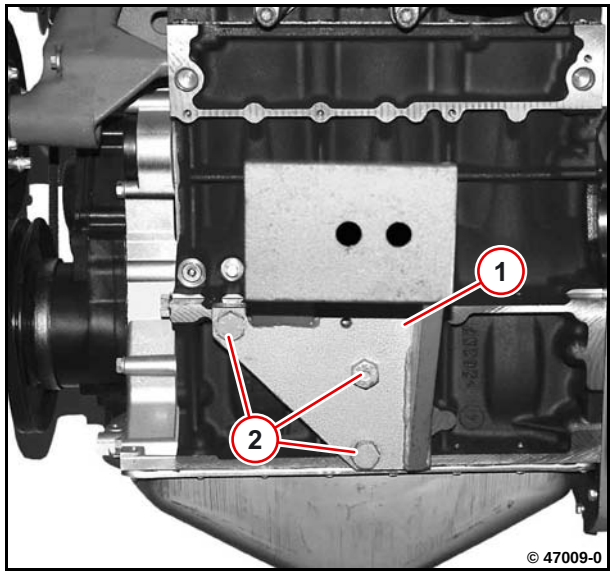


- Loosen lock nuts.
- Unscrew screws (2).
- Remove retainer plate (1).



Danger!
Lower engine with workshop crane.

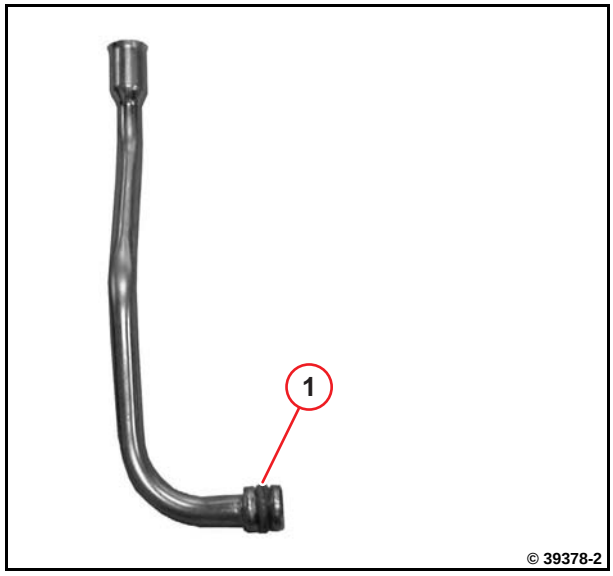
- Unscrew screws (2).
- Remove clamping bracket (1).



6

– **TD 2011 w, TCD 2011 w**

- Insert new O-ring (1).
- Lightly oil new O-ring (1).



– **TD 2011 w, TCD 2011 w**

- Mount oil return pipe (1).

Attention!
Install tension-free.

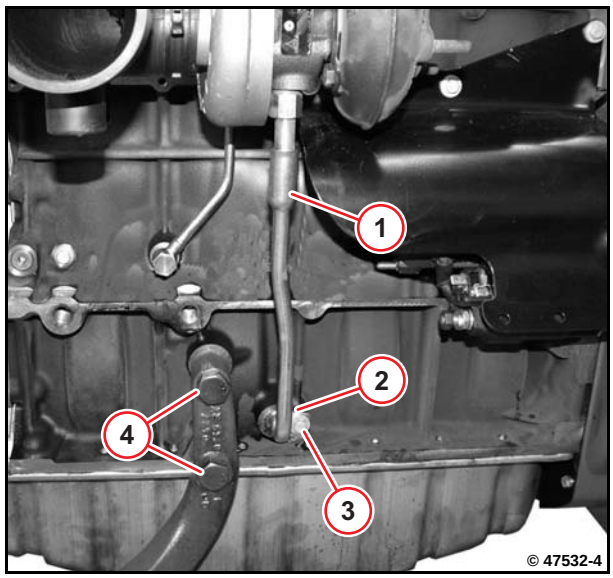
- Mount holder (2).
- Tighten screw (3).

8.5 Nm

– **D 2011 w, TD 2011 w, TCD 2011 w**

- Install all mounting feet.
- Tighten screws (4).

200 Nm

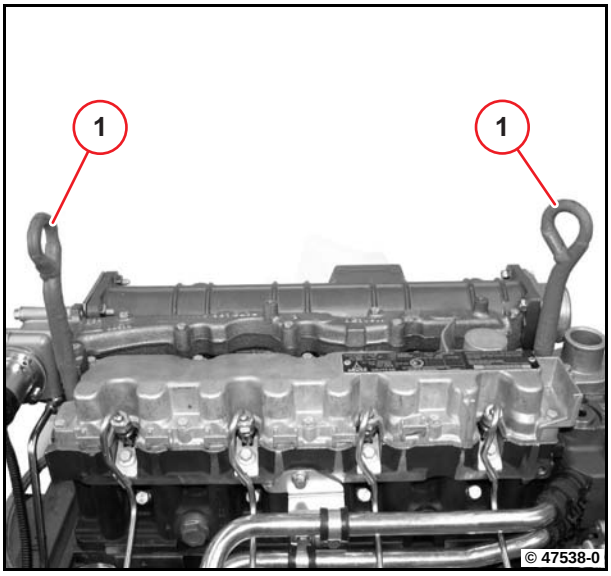


Danger!

Put the engine down on a secure surface.

- Unhook the engine from the workshop crane.
- Unscrew eyelet bolts (1).
- Install starter.

W 13-03-02



Technical Data

Testing and setting data

ID no.	Name	Additional information	Value
P00 04	Engine weight according to DIN 70020-A		approx. 268 kg

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A00 001	Clamping bracket on crankcase			90 Nm
A00 002	Clamping bracket on adapter for assembly block			90 Nm
A00 003	Mounting foot/engine mounting on crankcase	M14x55-12.9 M14x100-12.9		200 Nm
TD 2011 w, TCD 2011 w				
A08 049	Holder oil return line on crankcase	Torx, M6x14-8.8		8.5 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Setting valve clearance

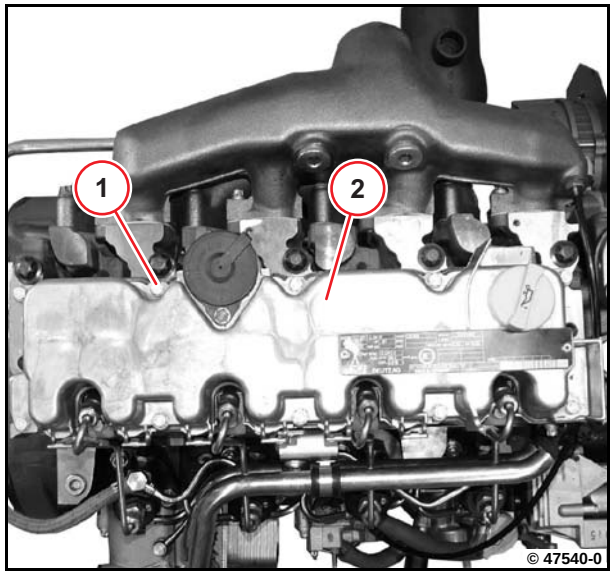
Commercial available tools:
– Feeler gauges

Attention!
In case of internal exhaust gas recirculation, the inlet valve is opened briefly by an additional cam on the camshaft.
This is not to be confused with the valve overlap.

Allow the engine to cool down for at least 30 minutes before setting the valve clearance. Engine oil temperature < 80 °C

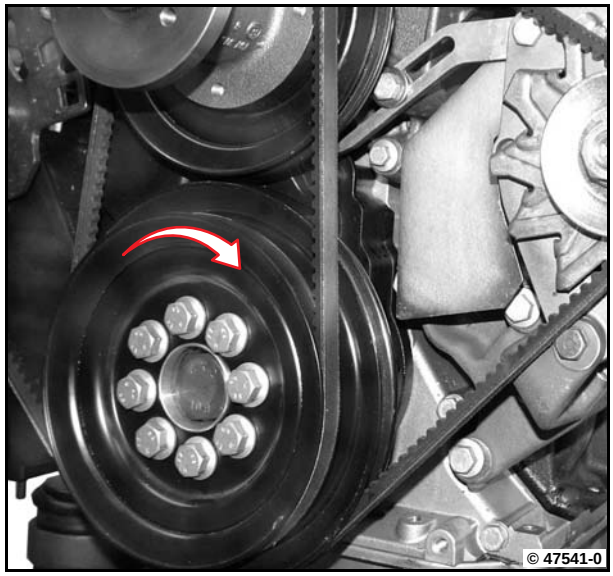
The following work procedure describes the setting of the valve clearance on an inlet valve. The procedure is the same for the setting on an outlet valve, taking into consideration the setting dimension.

- Unscrew all screws (1).
- Remove cylinder head cowling (2).
- Remove gasket.



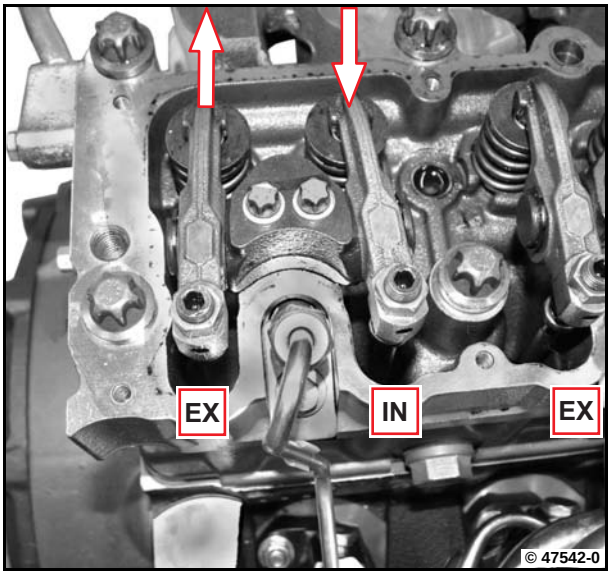
Setting engine to valve overlap

- Turn crankshaft in the direction of the engine (arrow).
- Turn over crankshaft until the valve overlap is achieved on cylinder 1.



Arrangement of the inlet and exhaust valves.
IN = inlet valve
EX = exhaust valve

Valve overlap means:
The inlet valve starts opening,exhaust valve closes.

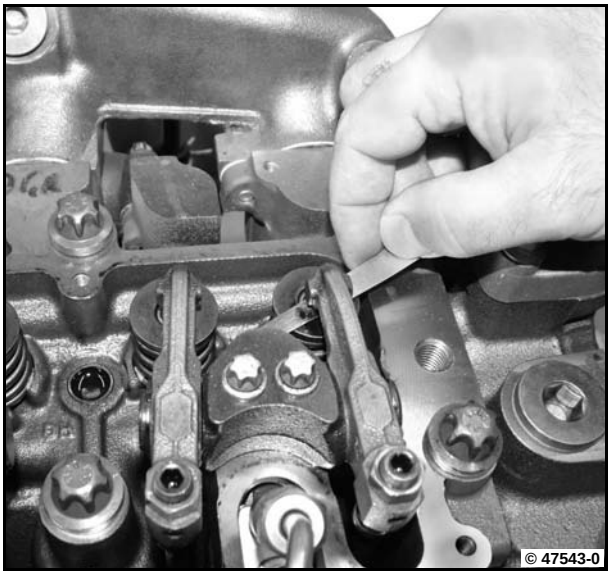


Attention!
In case of internal exhaust gas recirculation, the inlet valve is opened briefly by an additional cam on the camshaft.
This is not to be confused with the valve overlap.

6

- Select feeler gauge.
- Check the setting on the appropriate valve.

The feeler gauge must pass between the rocker arm's sliding surface and the valve without too much resistance.



Setting valve clearance

- Loosen lock nut (1).
- Hold adjusting screw (2).
- Set valve clearance.

If there is not enough valve clearance, unscrew setting screw (2).

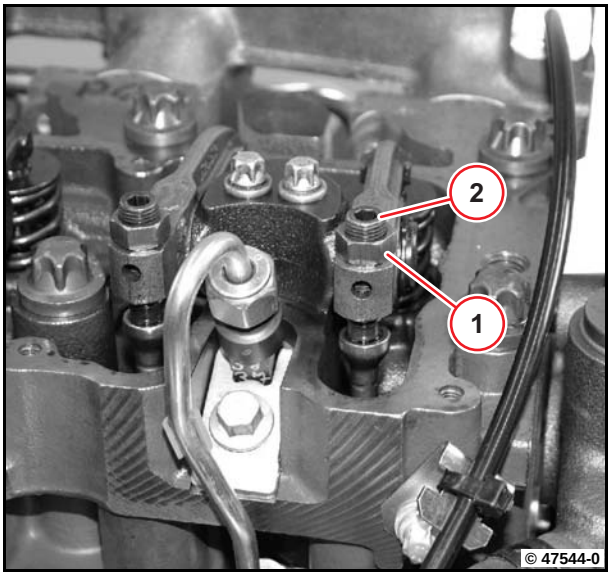
If there is too much valve clearance, turn in setting screw (2).

– Inlet

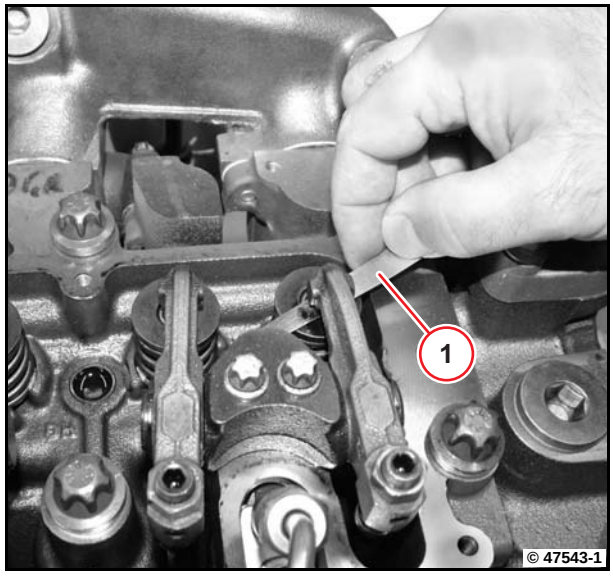
0.3 mm

– Outlet

0.5 mm



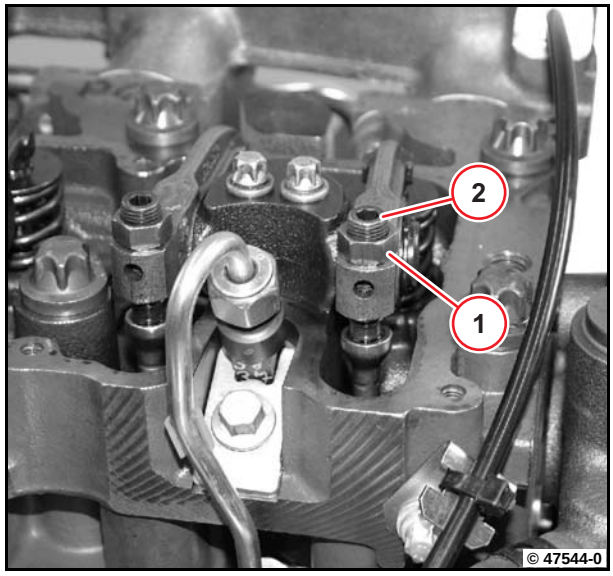
- Check the valve clearance with feeler gauge (1).



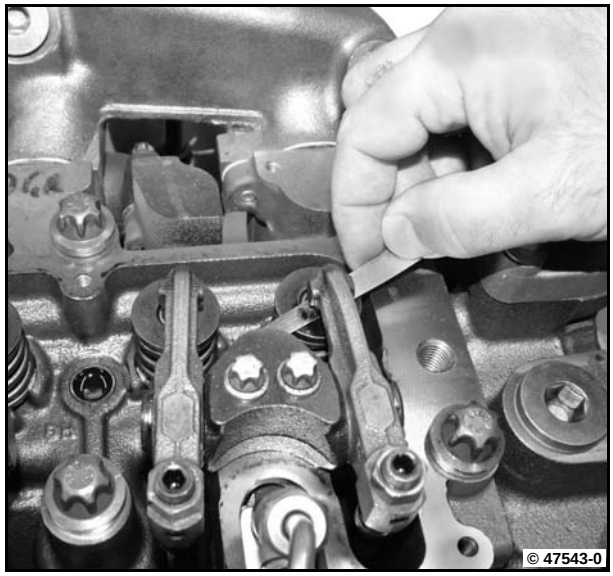
- Hold adjusting screw (2).
- Tighten lock nut (1).

20 Nm

Do not turn the setting screw when tightening the locking nut.

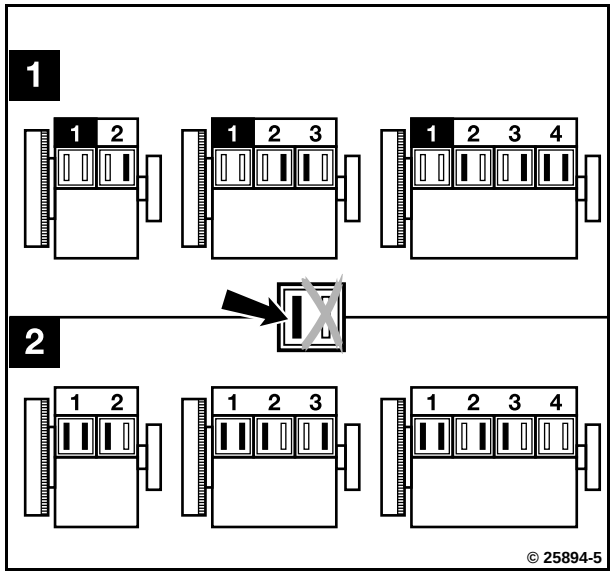


- Check the valve clearance again with feeler gauge.



Valve clearance setting schematic

According to the order given below, the setting of the valve clearance is possible in two turns of the crankshaft (each 360°).



Crankshaft position 1

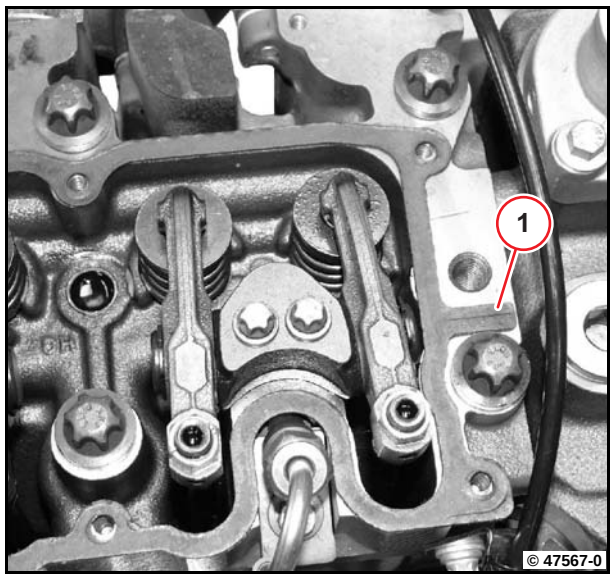
- Turn over crankshaft until the valve overlap is achieved on cylinder 1.
- Set black marked valves.

Crankshaft position 2

- Turn the crankshaft one turn (360°).
- Set black marked valves.

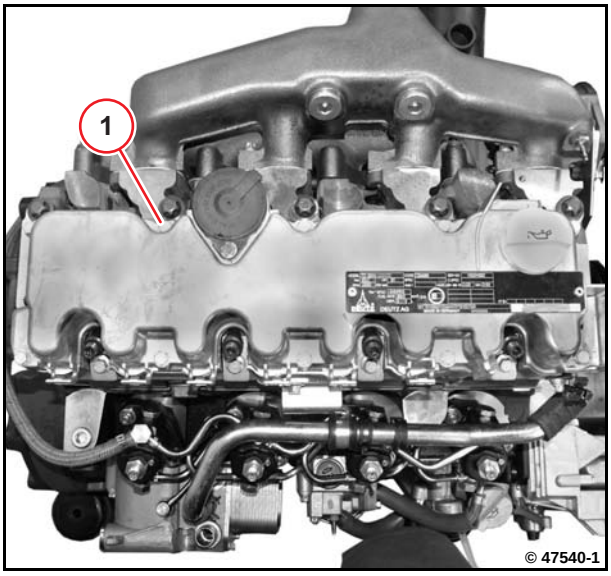
- Clean sealing surfaces.
- Mount new gasket.

Note installation position: The bar (1) must face the front cover.



- Mount cylinder head cover.
- Oil the screws lightly.
- Tighten all screws (1) alternately.

8.5 Nm



Technical Data

Testing and setting data

ID no.	Name	Additional information	Value
P00 71	Ignition sequence		1-3-4-2
P01 61	Valve clearance (inlet)		0.3 mm
P01 62	Valve clearance (outlet)		0.5 mm

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A01 003	Locking nut, valve adjuster			20 Nm
A01 004	Cylinder head cover on cylinder head			8.5 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

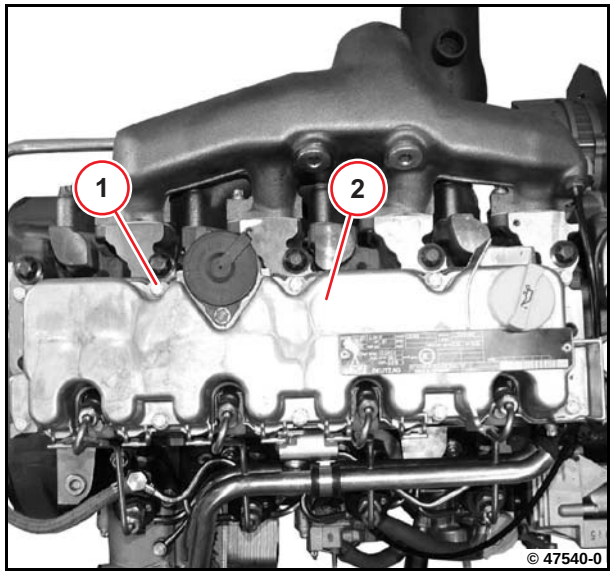
Removing and installing the rocker arm and rocker arm bracket

Commercial available tools:
– Torx tool set 8189

– W 01-01-01

Removing the rocker arm and rocker arm bracket

- Unscrew all screws (1).
- Remove cylinder head cowling (2).
- Remove gasket.



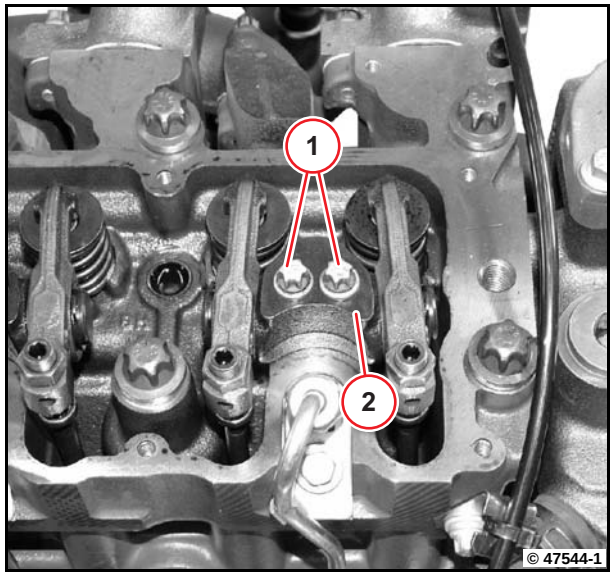
- Unscrew screws (1).

Loosen screws evenly to avoid tension on the rocker arm brackets.

- Remove rocker arm bracket (2).

Lay out components in the order in which they should be installed.

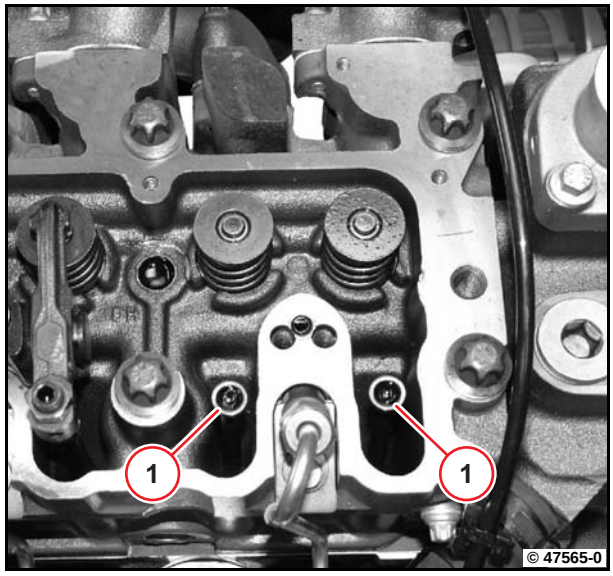
Note order of cylinders.



- Remove push rods (1).

Lay out components in the order in which they should be installed.

- Visually inspect the components.



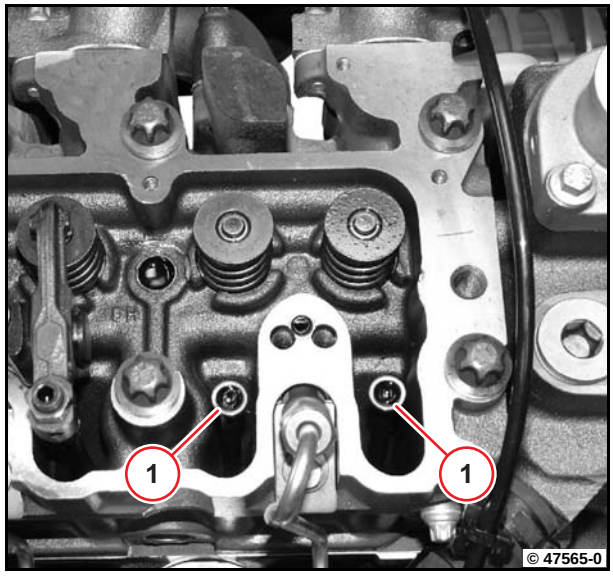
6

Installing the rocker arm and rocker arm bracket

- Insert stop rods (1).

Note the assignment of the stop rods.

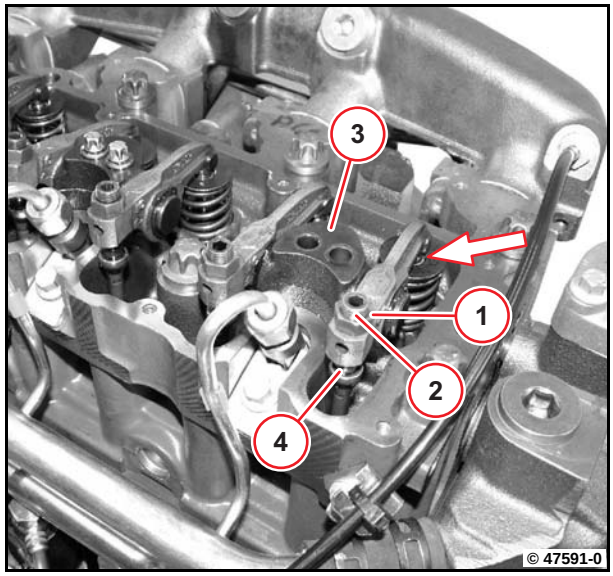
The stop rod must be seated with the ball head in the ladle of the tappet.



- Loosen lock nut (1).
- Unscrew setting screws (2).
- Mount rocker arm bracket (3).
- Position rocker arm.

The ball heads (4) must be seated in the ladles of the stop rods.

The rocker arm (arrow) must sit on the valve stem.



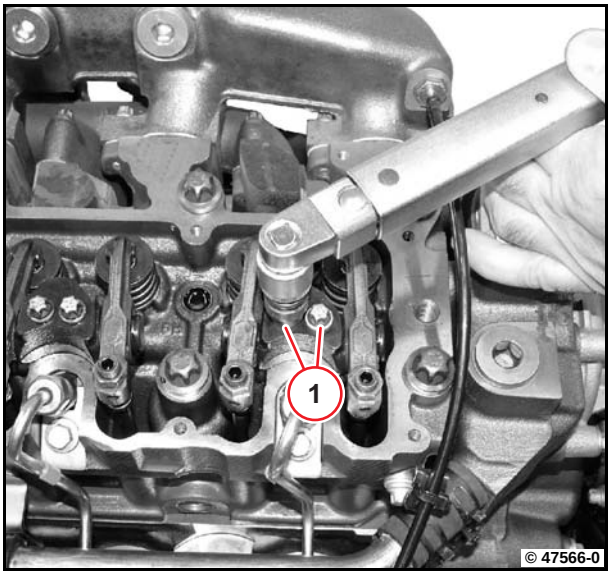
- Lightly oil screws (1).
- Tighten screws .

21 Nm

Attention!
Makes sure that the stop rods are not under stress due to valve overlap when fastening the screws.

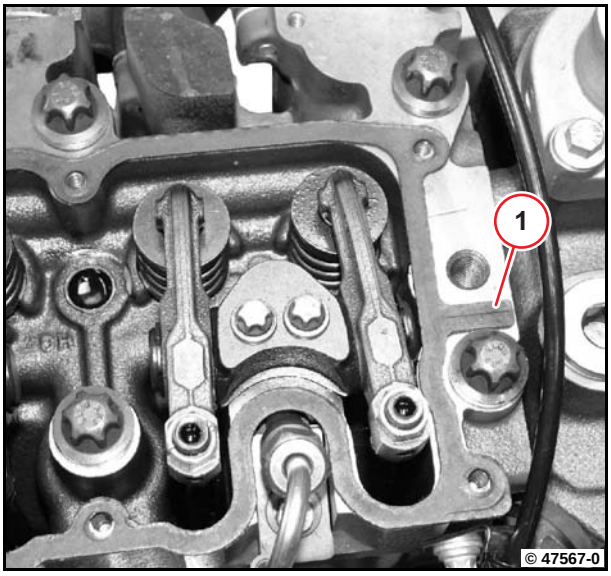
- Set valve clearance.

W 01-01-01



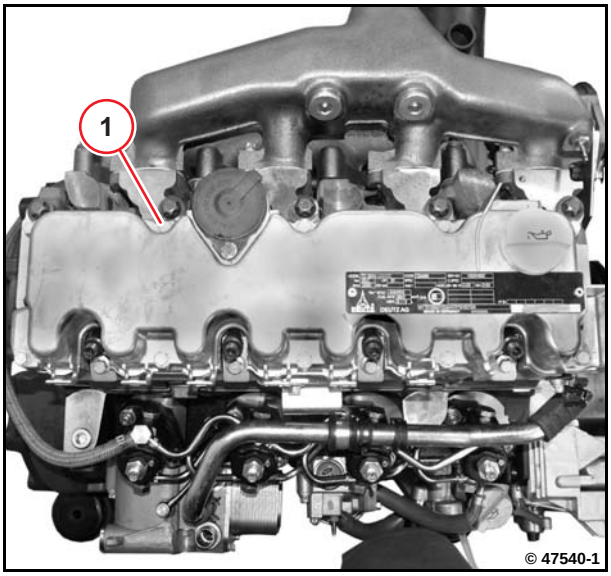
- Clean sealing surfaces.
- Mount new gasket.

Note installation position: The bar (1) must face the front cover.



- Mount cylinder head cover.
- Oil the screws lightly.
- Tighten all screws (1) alternately.

8.5 Nm



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A01 002	Rocker arm bracket on cylinder head			21 Nm
A01 004	Cylinder head cover on cylinder head			8.5 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Disassembling, assembling and checking the rocker arm and rocker arm bracket

Commercial available tools:
– Internal measuring device
– Micrometer gauge
– Locking ring pliers

Special tools:
– Dial gauge. 100400

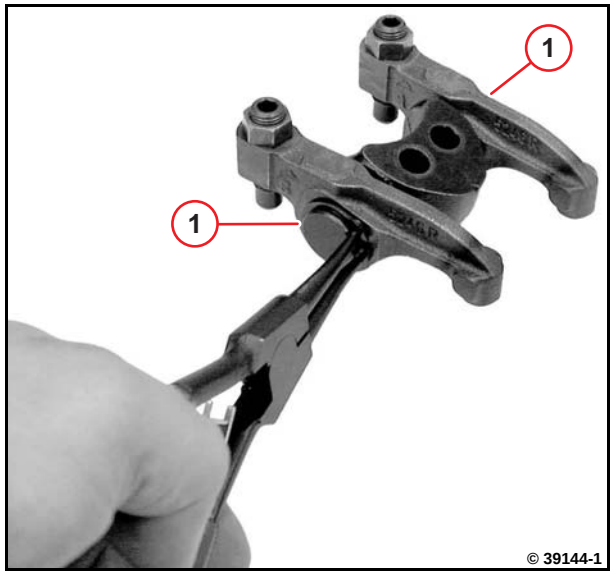
– W 01-02-02

Disassembling the rocker arm bracket

- Remove rocker arm and rocker arm bracket.

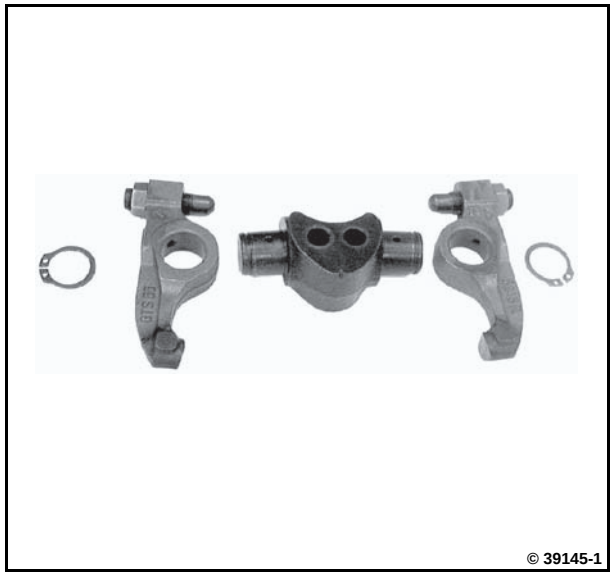
  W 01-02-02

- Remove locking ring (1).



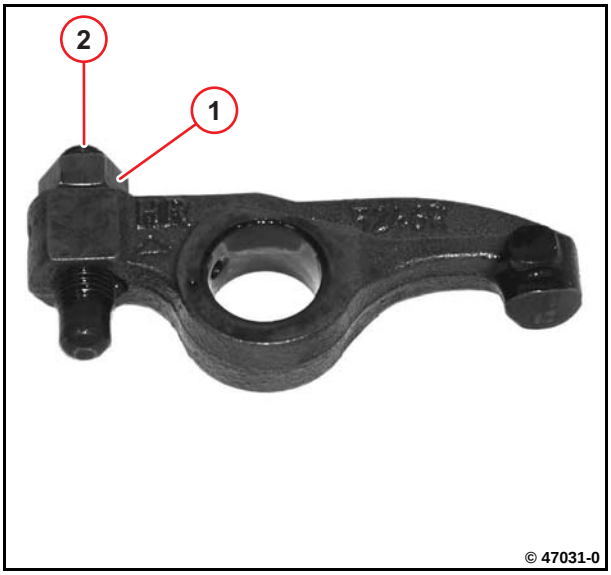
- Remove rocker arm.

Lay out components in the order in which they should be installed.



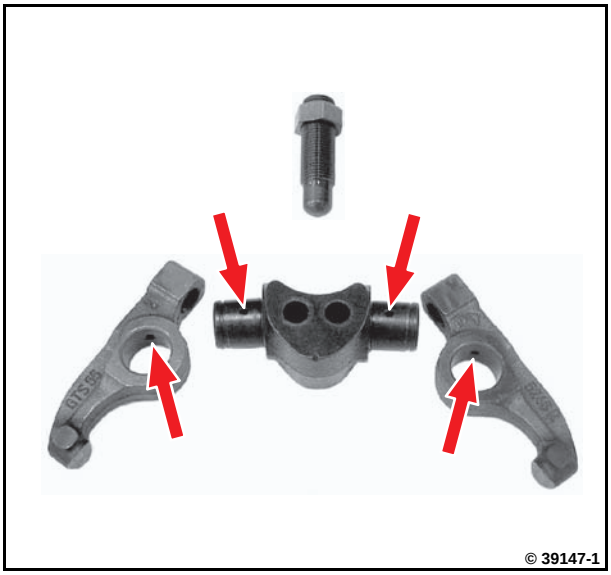
- Hold adjusting screw (2).
- Loosen lock nut (1).
- Unscrew adjusting screw (2).

Lay out components in the order in which they should be installed.

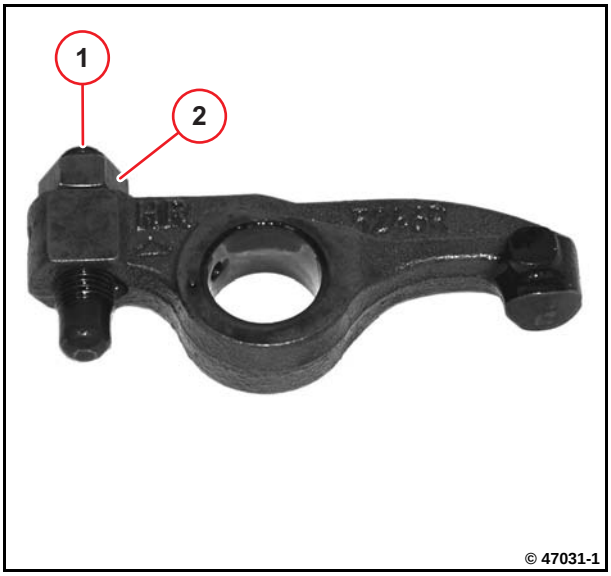


6

- Visually inspect the components.
- Check oil channels (arrows) for free passage.

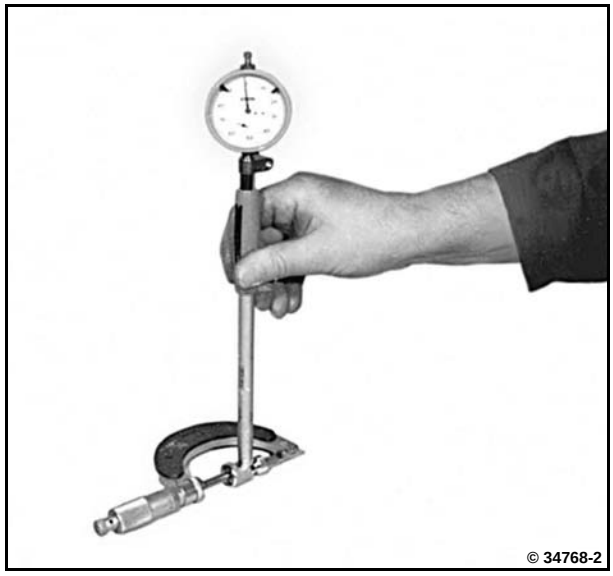


- Screw in setting screw (1).
- Screw in locking nut (2).



Checking the rocker arm

- Prepare internal measuring device:
  - Mount probe bolt for the appropriate measuring range in the internal measuring device.
  - Mount dial gauge with approx. 1 mm pre-tension in the internal measuring device.
  - Set micrometer gauge to 18 mm.
  - Balance the internal measuring device between the test surfaces of the micrometer gauge and set the dial gauge at the reversal point of the pointer to "0".

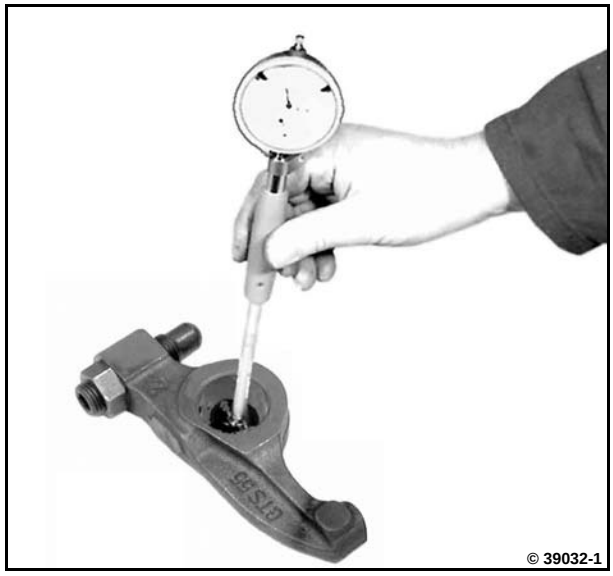


- Insert internal measuring device.
- Measure rocker arm bore.
  - Outlet

    $18^{+0.27}$ mm
  - Inlet

    $18^{+0.27}$ mm

When the wear limit is reached the rocker arm must be renewed.

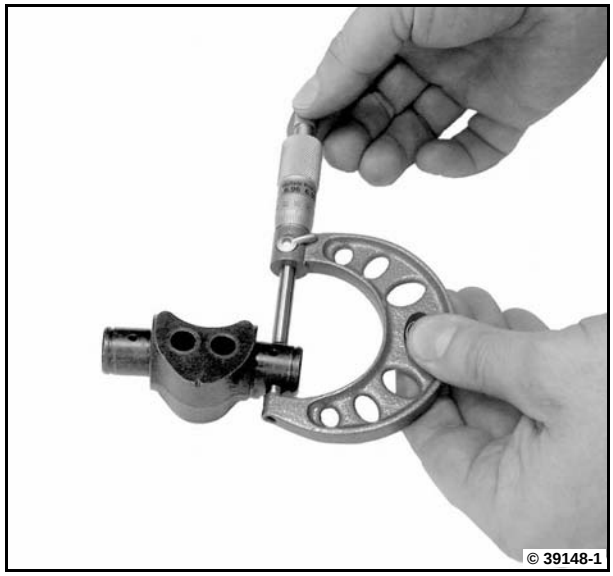


Checking the rocker arm pin

- Measure diameter with micrometer gauge.

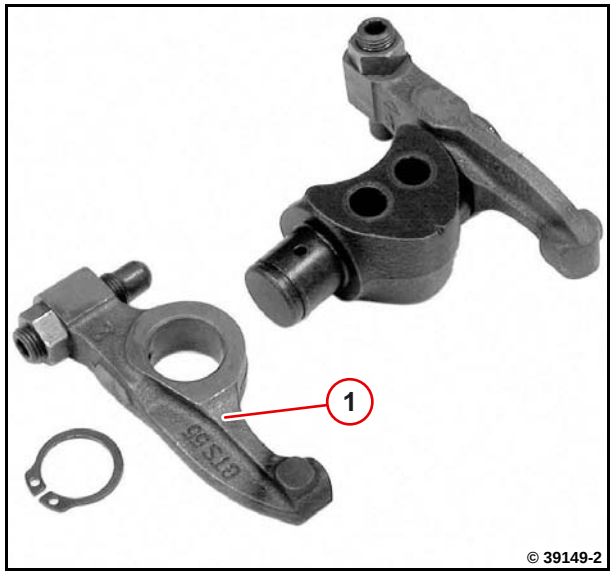
  $17{,}97^{+0.01}_{-0.01}$ mm

When the wear limit is reached the rocker arm bracket must be replaced.



Assembling the rocker arm bracket

- Lightly oil the rocker arm pin.
- Push rocker arm (1) onto rocker arm pin.

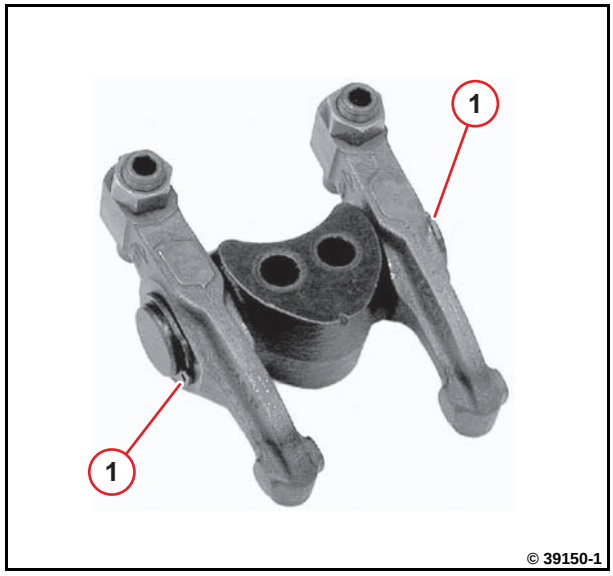


- Insert new locking rings (1).

Ensure that the installation location is free from faults.

- Install rocker arm and rocker arm bracket.

W 01-02-02



Technical Data

Testing and setting data

ID no.	Name	Additional information	Value
P01 72	Rocker arm, bore, diameter (outlet)		$18^{+0.27}$ mm
P01 73	Rocker arm, bore, diameter (inlet)		$18^{+0.27}$ mm
P01 74	Rocker arm pin, diameter		$17{,}97^{+0.01}_{-0.01}$ mm

6

Removing and installing cylinder head

Commercial available tools:
– Socket wrench insert Torx E18 8116
– Dog wrench. 8018
– Rotation angle disc 8190

Special tools:
– Plugs/caps 170160

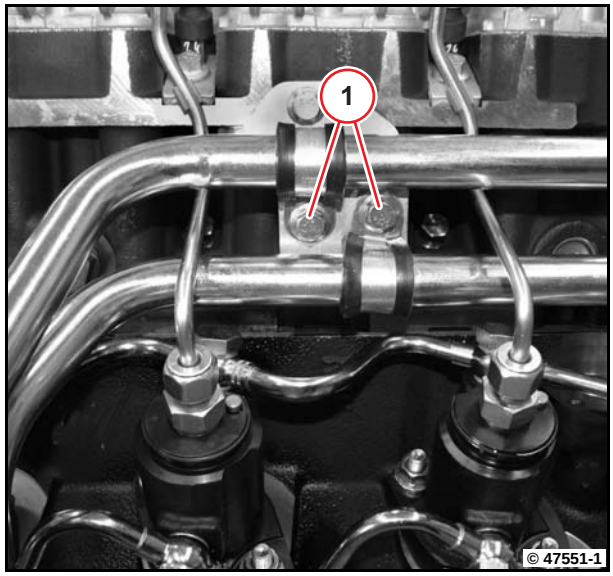
– W 01-02-02
– W 01-04-09
– W 06-02-03 . . . . . TD 2011 w, TCD 2011 w
– W 06-07-03 . . . . . D 2011 w
– W 06-09-08 . . . . . TD 2011 w, TCD 2011 w
– W 09-08-04

Attention!
Pay attention to utmost cleanliness when working on the fuel system.
Remove residue paint and particles of dirt before removing.
Clean the respective affected parts carefully. Blow damp areas dry with compressed air.
Observe the safety regulations and national specifications for handling fuels.
Close all connections immediately after opening with new, clean plugs/caps.
Do not remove plugs/caps until immediately before assembling.
Collect leaking operating substances in suitable vessels and dispose of according to regulations.
After all work on the fuel system, it must be bleeded - see the operation manual, chapter "6 Fuel system“.

6

Removing the cylinder head

● Unscrew screws (1).



- Unscrew lock nuts (1) with dog wrench.
- Remove thermostat housing.

W 09-08-04

– **D 2011 w**

- Remove the air intake pipe.

W 06-07-03

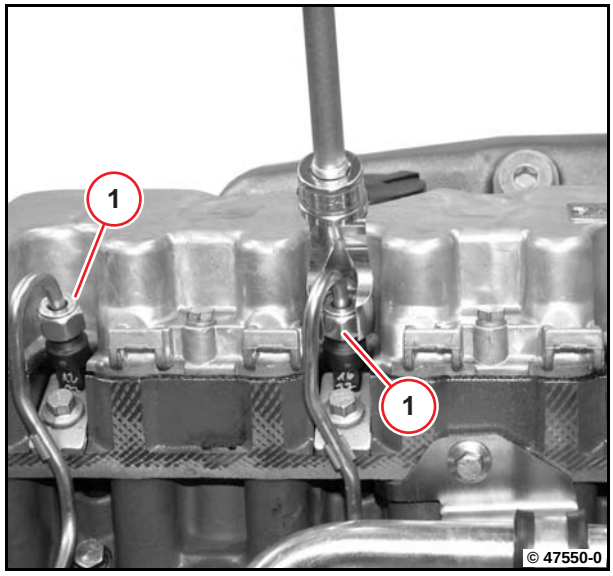
– **TD 2011 w, TCD 2011 w**

- Remove the charge air pipe.

W 06-02-03

- Remove exhaust gas collection pipe.

W 06-09-08



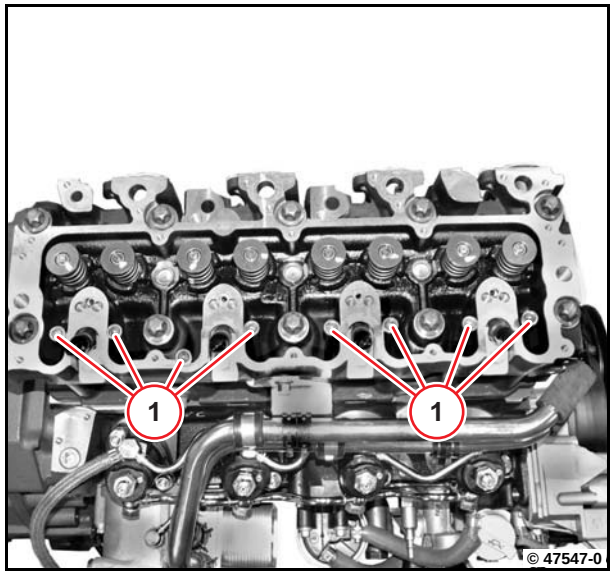
- Remove rocker arm and rocker arm bracket.

W 01-02-02

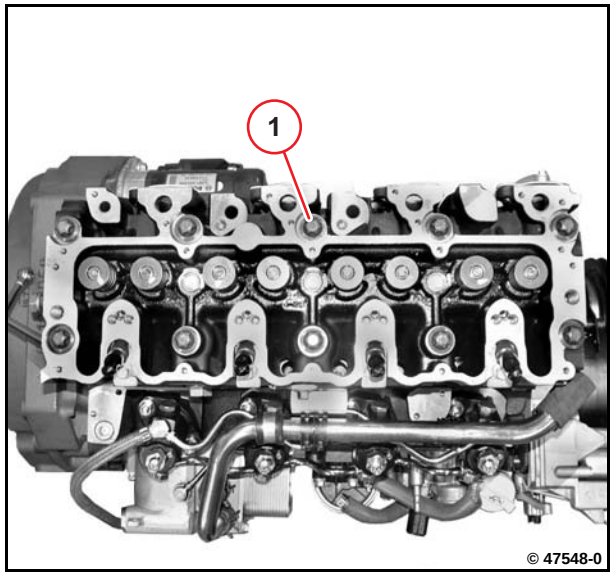
- Remove push rods (1).

Lay out components in the order in which they should be installed.

Note order of cylinders.



- Unscrew all screws (1) with the socket wrench insert.
- Remove cylinder head.
- Remove gasket.
- Visually inspect the components.



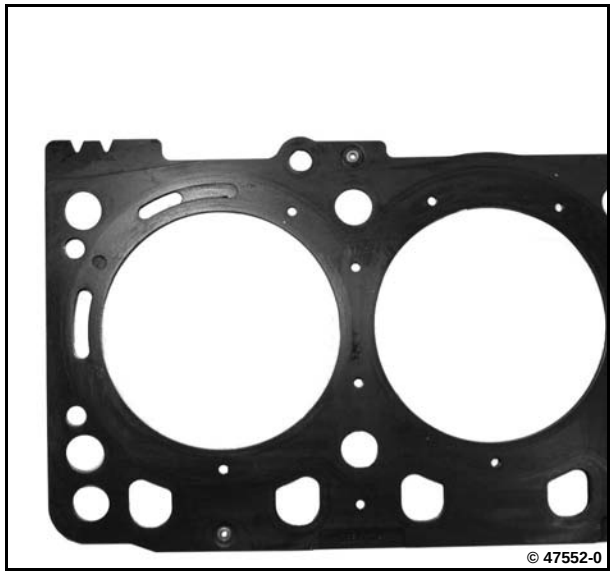
Installing the cylinder head

Measure the piston overhang on all pistons.

Select cylinder head gasket according to the largest piston projection measured.

- Check piston overhang.

W 01-04-09



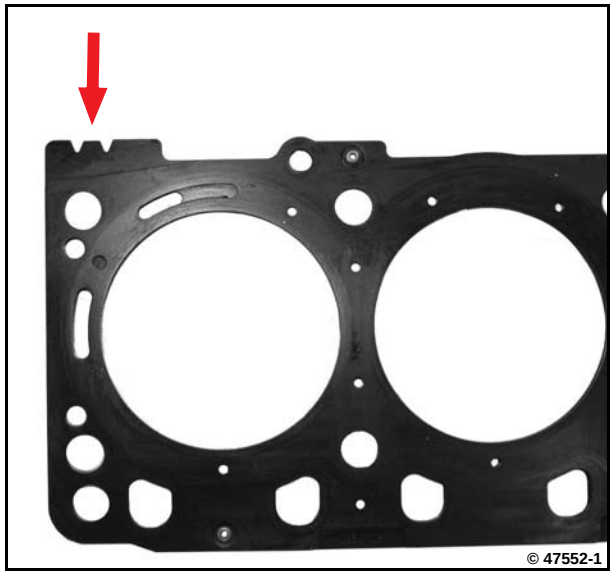
- Select cylinder head gasket according to the largest piston projection measured.
  - 1 recess

    0.325 - 0.604 mm
  - 2 recesses

    0.605 - 0.704 mm
  - 3 recesses

    0.705 - 0.804 mm

Example:Piston overhang = 0.7 mm, corresponds to cylinder head gasket with 2 recesses (arrow).



  - **Recess cylinder head**

- Select cylinder head gasket according to the largest piston projection measured.
  - 1 recess

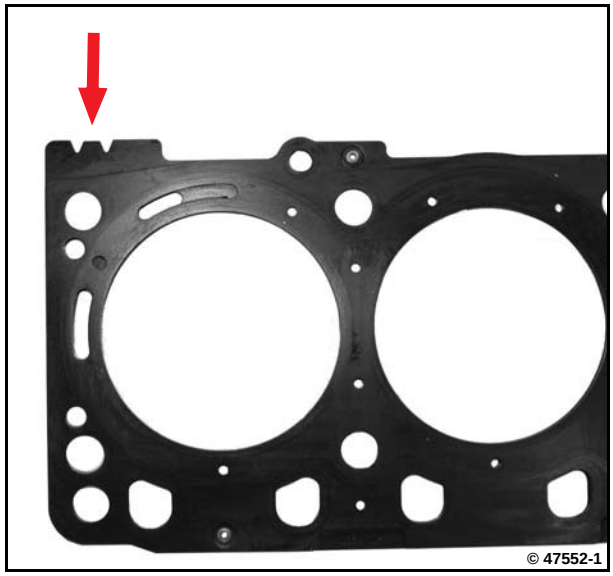
    9.820 - 10.140 mm
  - 2 recesses

    10.141 - 10.239 mm
  - 3 recesses

    10.240 - 10.310 mm

Example:Piston overhang = 10.150 mm, corresponds to cylinder head gasket with 2 recesses (arrow).

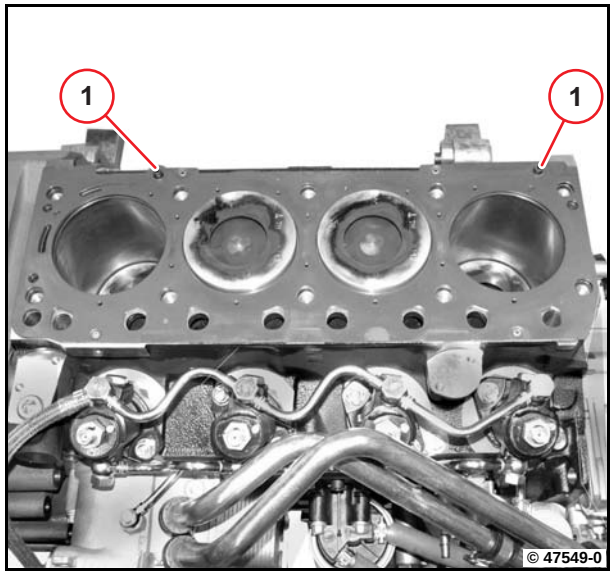
- Remove the measuring device and holders.



- Clean sealing surfaces.

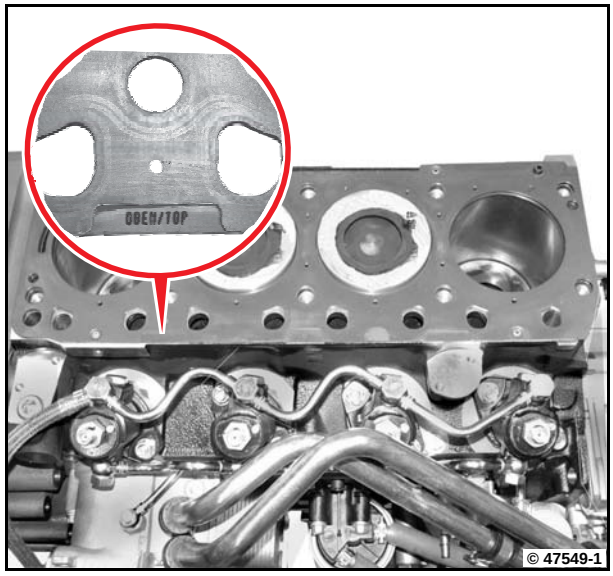
The sealing surfaces for the cylinder head gasket must be clean and free of oil.

Make sure the clamping bushings (1) are in place.



- Fit a new cylinder head gasket.

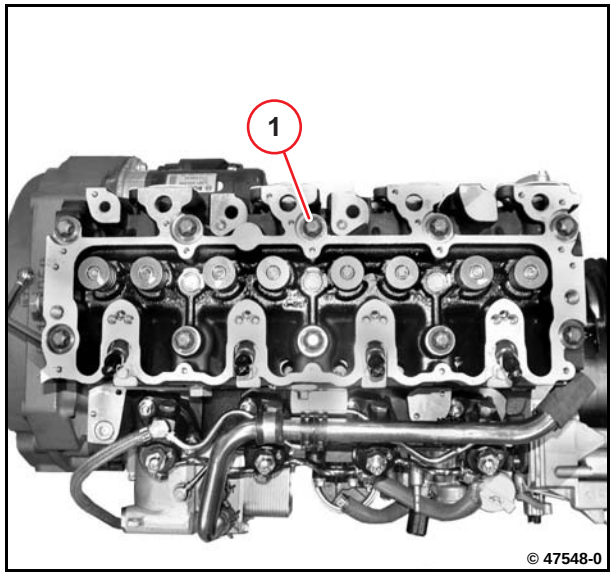
Label OBEN / TOP facing the cylinder head.



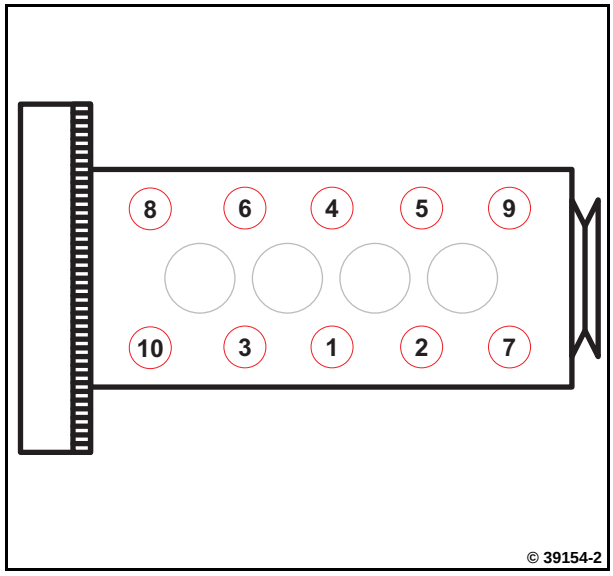
- Fit cylinder head.
- Oil the cylinder head screws slightly.

Attention!
Screws can be reused a maximum 3 times with written documentation.

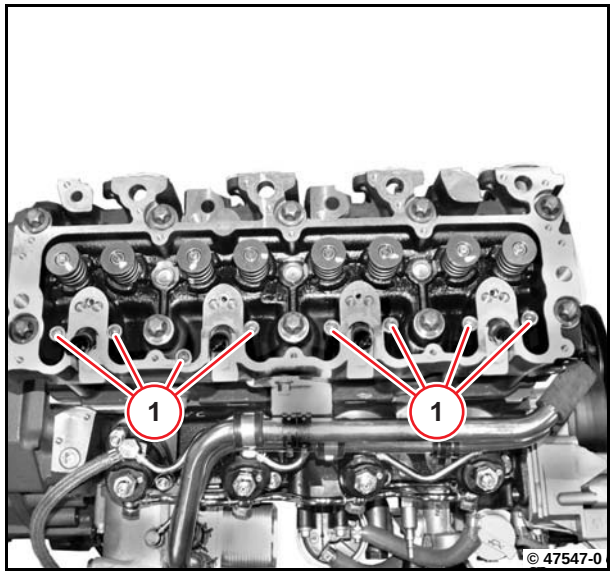
- Fasten all screws (1).



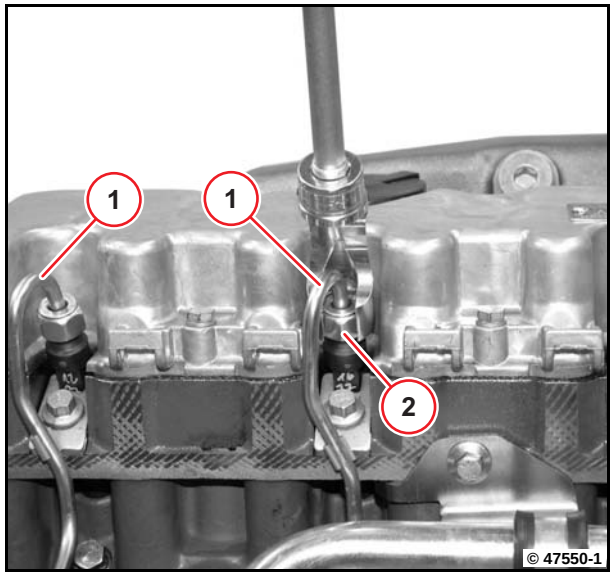
- Tighten cylinder head screws with socket wrench insert according to the tightening sequence.
  - Stage 1:
    30 Nm
  - Stage 2:
    80 Nm
  - Stage 3:
    160 Nm
  - Stage 4:
    90°



- Insert stop rods (1).
- Install rocker arm and rocker arm bracket.
  W 01-02-02
  - **D 2011 w**
- Install the air intake pipe.
  W 06-07-03
  - **TD 2011 w, TCD 2011 w**
- Install the charge air pipe.
  W 06-02-03



- Install exhaust gas collection pipe.
  W 06-09-08
- Install thermostat housing.
  W 09-08-04
- Mount new injection lines (1).
- Tighten union nuts (2) with claw spanner.
  25 Nm

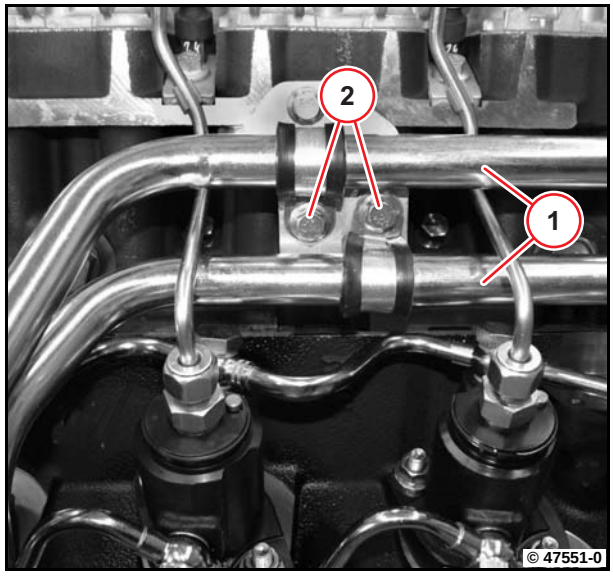


- Position clamping claws (1).

Attention!
Install tension-free.

- Tighten screws (2).

21 Nm



6

Technical Data

Testing and setting data

ID no.	Name	Additional information	Value
P02 75	Piston overhang	Identification, cylinder head gasket = 1 recess	0.325 - 0.604 mm
P02 76	Piston overhang	Identification, cylinder head gasket = 2 recesses	0.605 - 0.704 mm
P02 77	Piston overhang	Identification, cylinder head gasket = 3 recesses	0.705 - 0.804 mm
Recess cylinder head			
P02 75	Piston overhang	Identification, cylinder head gasket = 1 recess	9.820 - 10.140 mm
P02 76	Piston overhang	Identification, cylinder head gasket = 2 recesses	10.141 - 10.239 mm
P02 77	Piston overhang	Identification, cylinder head gasket = 3 recesses	10.240 - 10.310 mm

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A01 001	Cylinder head on crankcase		Stage 1: Cylinder head screws can be used a maximum of 3x with written documentation. Otherwise use new cylinder head screws. Observe tightening sequence.	30 Nm
A01 001	Cylinder head on crankcase		Stage 2	80 Nm
A01 001	Cylinder head on crankcase		Stage 3	160 Nm
A01 001	Cylinder head on crankcase		Stage 4	90°
A07 003	Injection line on fuel injector / injection pump	M12x1.5		25 Nm
A09 020	Pipe clip on holder	M6x16		21 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

Checking piston overhang

Commercial available tools

Special tools:
– Dial gauge. 100400
– Digital dial gauge 100410
– Measuring device 100750
– Holder 150180

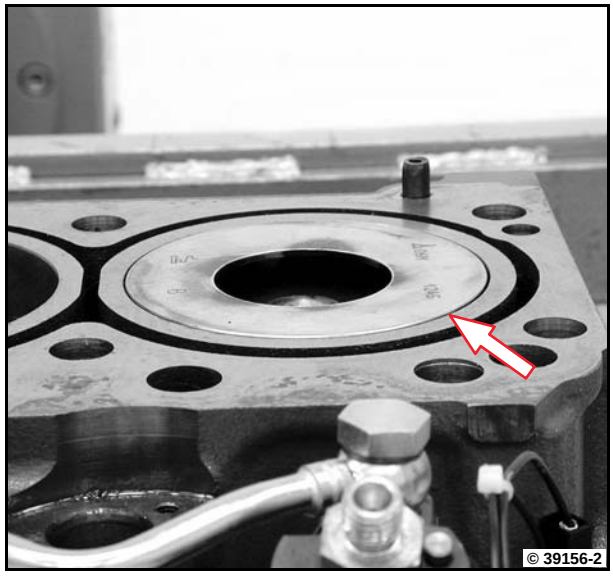
– W 01-04-04

Checking piston overhang

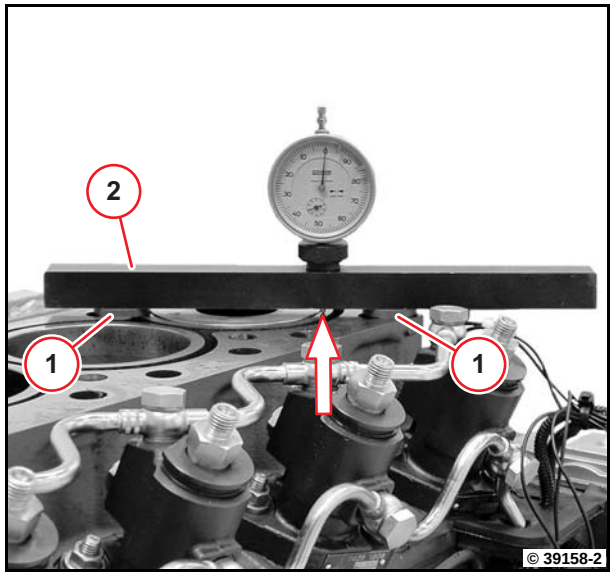
- Remove cylinder head.

  W 01-04-04

- Turn the crankshaft until the respective piston is just in front of the top dead centre (arrow).

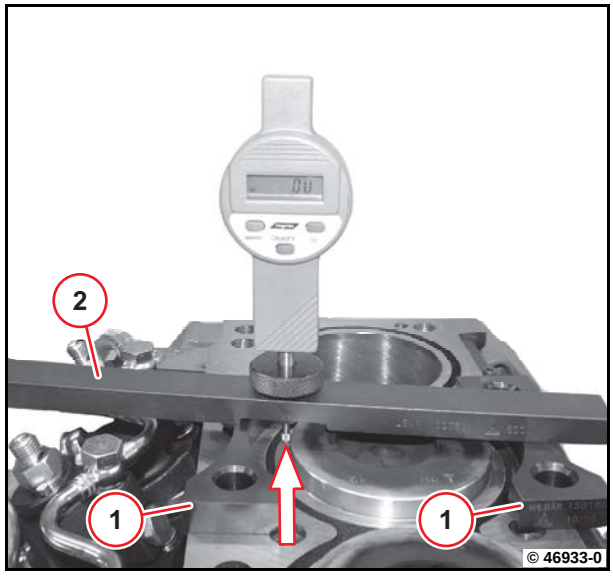


- Insert dial gauge 100400 in measuring beam.
- Place spacing washers (1) on the sealing surface of the crankcase.
- Place measuring beam (2) on the spacing washers.
- Apply stylus of the dial gauge to the crankcase sealing surface with pre-tension (arrow).
- Adjust dial gauge to "0".



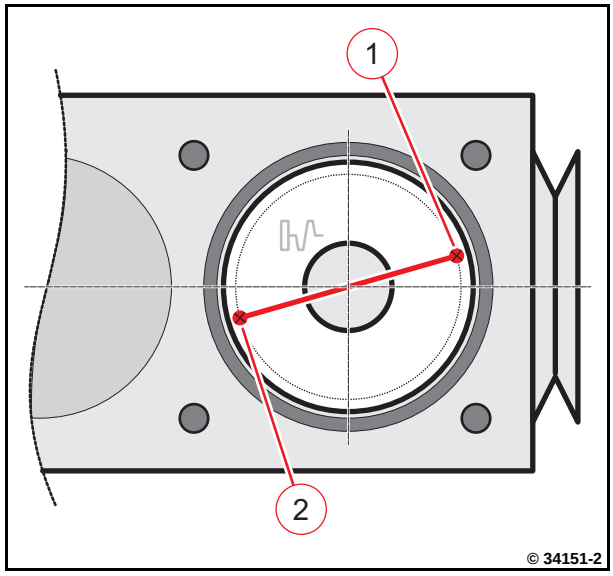
– **Recess cylinder head**

- Insert dial gauge 100410 in measuring beam.
- Place holders (1) on the sealing surface of the crankcase.
- Place measuring beam (2) on the holders.
- Apply stylus of the dial gauge to the crankcase sealing surface with pre-tension (arrow).
- Adjust dial gauge to "0".



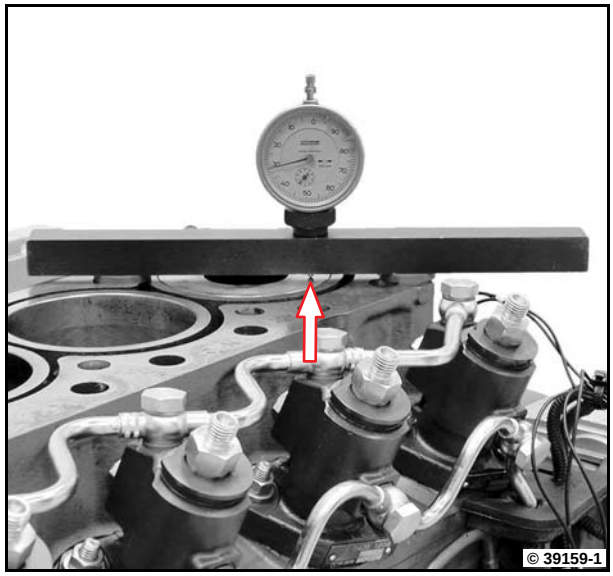
- Measure at the points (1) and (2) on the piston.

Schematic representation



- Move the measuring beam.
- Apply the stylus to the piston base (arrow) under pre-tension.
- Continue turning the crankshaft evenly until the reversal point of the pointer on the dial gauge is reached.

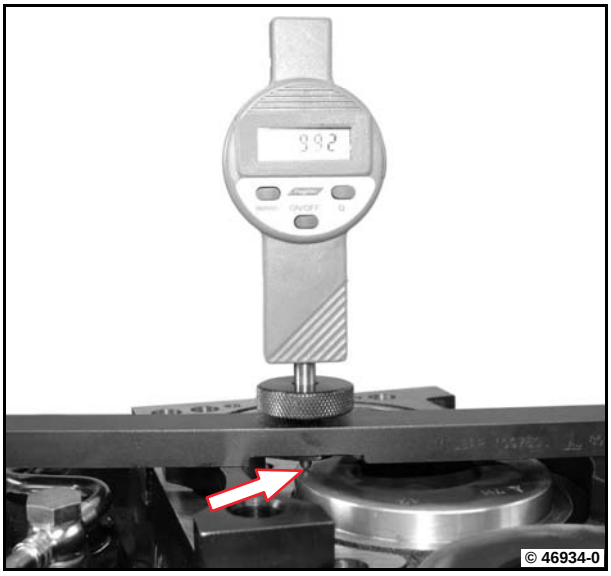
The stylus may not be positioned on the labelling of the piston.
Note greatest measured value.



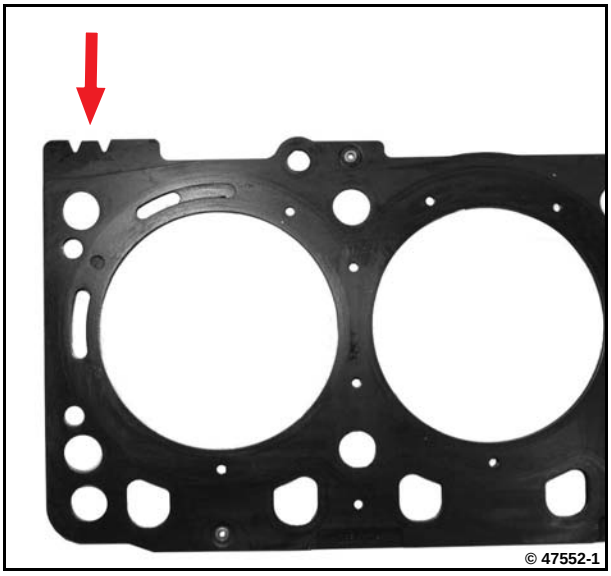
– **Recess cylinder head**

- Move the measuring beam.
- Apply the stylus to the piston base (arrow) under pre-tension.
- Continue turning the crankshaft evenly until the reversal point of the pointer on the dial gauge is reached.

The stylus may not be positioned on the labelling of the piston.
Note greatest measured value.



- Select cylinder head gasket according to the largest piston projection measured.
  – 1 recess
  0.325 - 0.604 mm
  – 2 recesses
  0.605 - 0.704 mm
  – 3 recesses
  0.705 - 0.804 mm



Example:Piston overhang = 0.7 mm, corresponds to cylinder head gasket with 2 recesses (arrow).

- Remove the measuring device and spacer discs.
- Install cylinder head.

W 01-04-04

– **Recess cylinder head**

- Select cylinder head gasket according to the largest piston projection measured.
  – 1 recess

    9.820 - 10.140 mm

  – 2 recesses

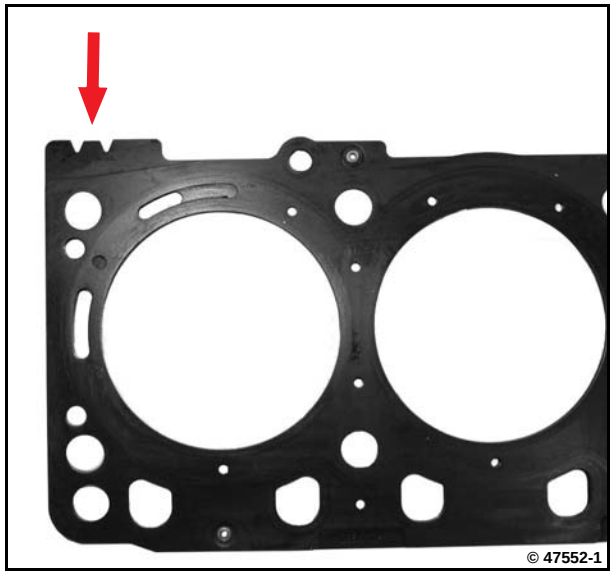
    10.141 - 10.239 mm

  – 3 recesses

    10.240 - 10.310 mm

  Example:Piston overhang = 10.150 mm, corresponds to cylinder head gasket with 2 recesses (arrow).

- Remove the measuring device and holders.
- Install cylinder head.



W 01-04-04

Technical Data

Testing and setting data

ID no.	Name	Additional information	Value
P02 75	Piston overhang	Identification, cylinder head gasket = 1 recess	0.325 - 0.604 mm
P02 76	Piston overhang	Identification, cylinder head gasket = 2 recesses	0.605 - 0.704 mm
P02 77	Piston overhang	Identification, cylinder head gasket = 3 recesses	0.705 - 0.804 mm
D 2011 w / TD 2011 w / TCD 2011 w Recess cylinder head			
P02 75	Piston overhang	Identification, cylinder head gasket = 1 recess	9.820 - 10.140 mm
P02 76	Piston overhang	Identification, cylinder head gasket = 2 recesses	10.141 - 10.239 mm
P02 77	Piston overhang	Identification, cylinder head gasket = 3 recesses	10.240 - 10.310 mm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

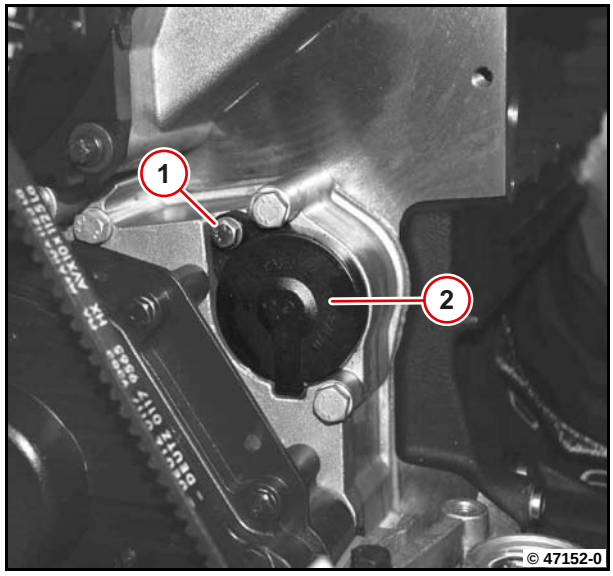
Removing and installing the crankcase bleeding

Commercial available tools

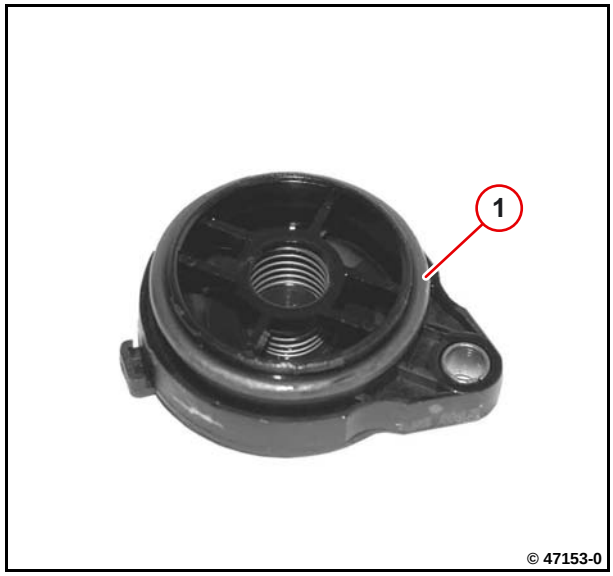
Special tools:
– Disassembly tool. 110901

Removing the crankcase bleeding

- Unscrew screw (1).
- Remove crankcase bleeding (2).

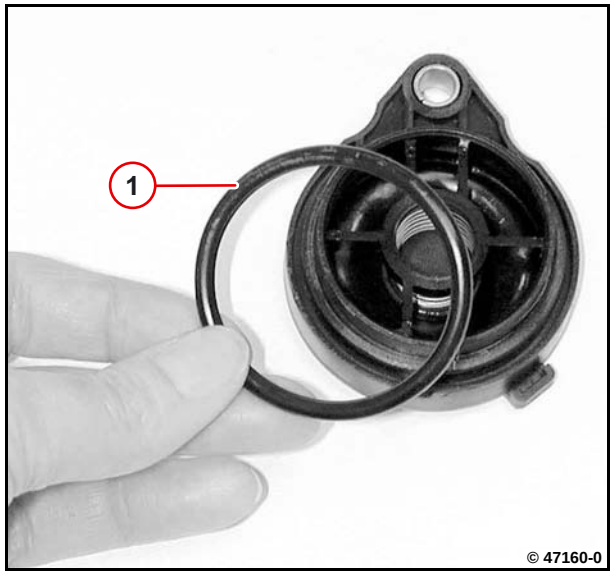


- Remove the O-ring (1) with the disassembly tool.
- Visually inspect the components.



Install crankcase bleeding

- Clean sealing surfaces.
- Insert new O-ring (1).



6

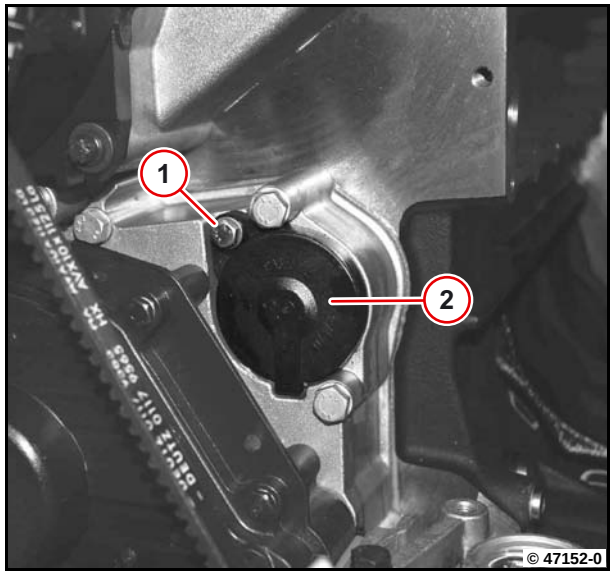
- Mount crankcase vent (2).

Ensure that the installation location is free from faults.

The crankcase bleeding must fit evenly.

- Tighten screw (1).

8.5 Nm



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A03 060	Crankcase bleeding on front cover / on cylinder head cover / on cylinder head			8.5 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

Removing and installing the exhaust line

Commercial available tools:
– Torx tool set 8189

– W 06-06-04

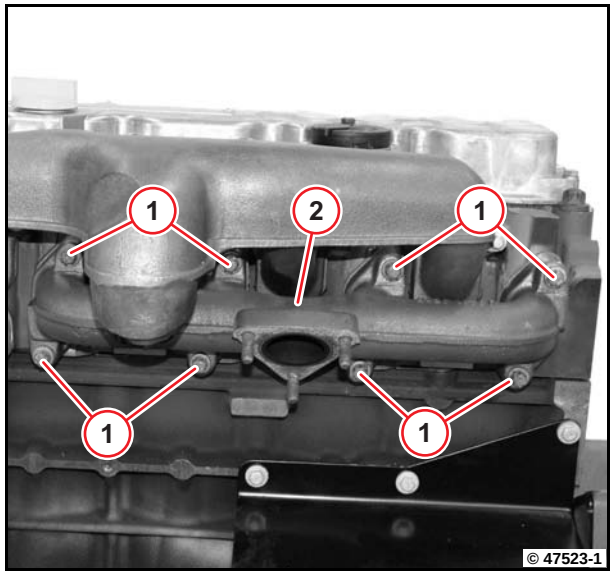
Removing exhaust line

– **TD 2011 w, TCD 2011 w**

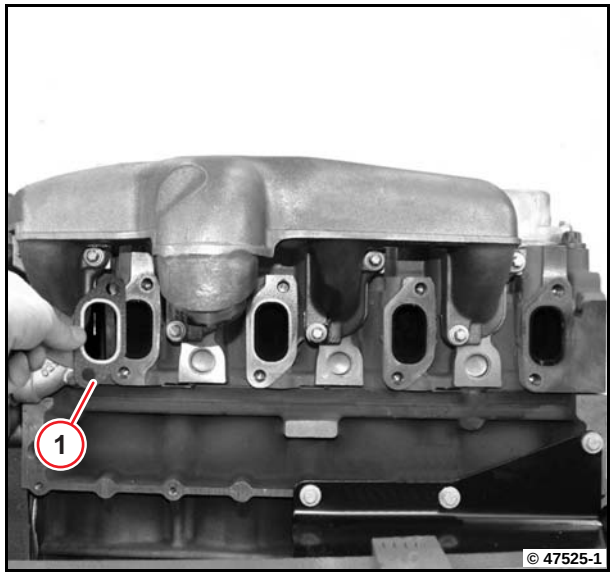
- Remove turbocharger.

  W 06-06-04

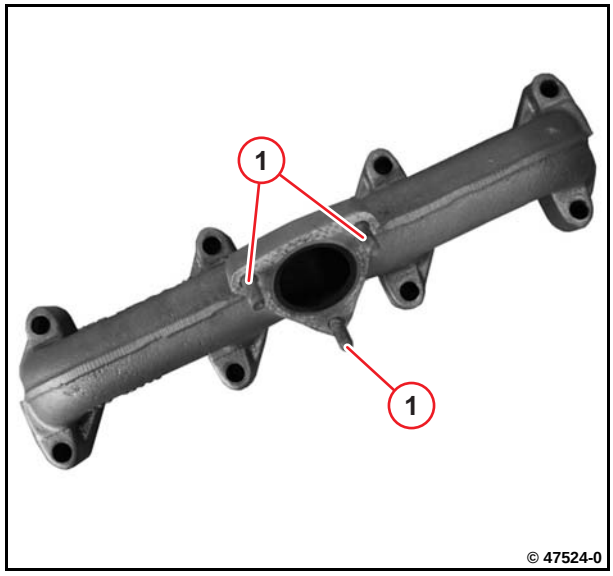
- Unscrew all screws (1).
- Remove exhaust line (2).



- Remove gaskets (1).



- Unscrew studs (1).
- Visually inspect the components.

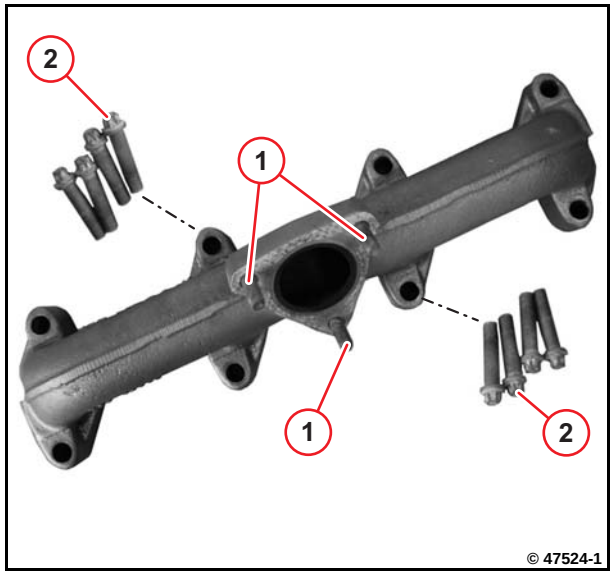


6

Installing exhaust line

- Clean sealing surfaces.
- Turn on new pin bolts (1).
- Tighten pin bolts (1).

12 Nm



- Clean sealing surfaces.
- Mount exhaust line (1).
- Mount new gaskets.

Note installation position.

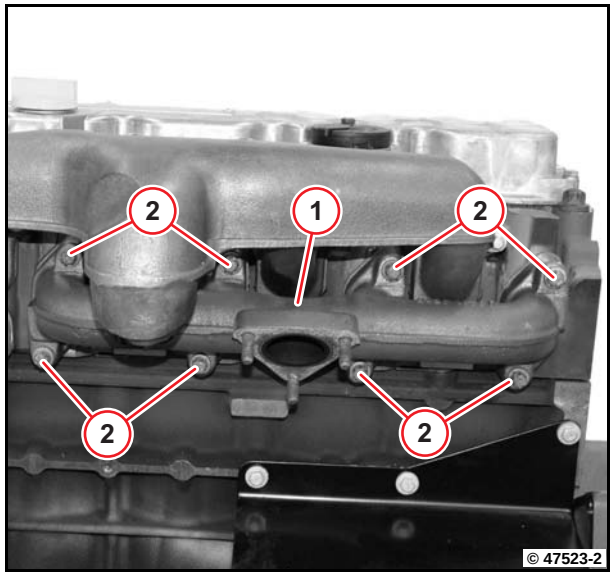
- Turn in new screws (2).
- Tighten new screws (2).

55 Nm

– **TD 2011 w, TCD 2011 w**

- Install the turbocharger.

W 06-06-04



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A06 001	Exhaust pipe at cylinder head	Torx screw, coated	Use new screws.	55 Nm
A06 004	Pin bolts on exhaust pipe	coated	Use new pin bolts	12 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

Removing and install the charge air line

Commercial available tools:
– Torx tool set 8189

– W 06-06-04
– W 06-01-05

Remove charge air line

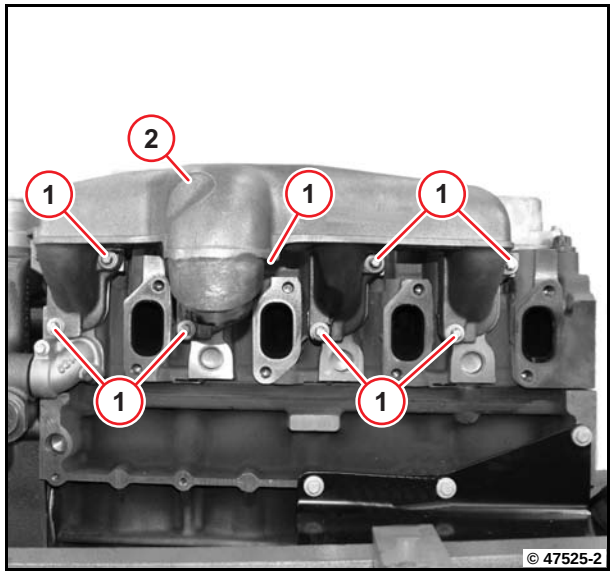
- Remove turbocharger.

  W 06-06-04

- Remove the exhaust pipe.

  W 06-01-05

- Unscrew all screws (1).
- Remove charge air pipe (2).
- Remove seals.



- Clean sealing surfaces.

Install charge air line

- Mount charge air line (1).
- Mount new gaskets.
- Tighten screws (2) alternately working from the centre to the outside.

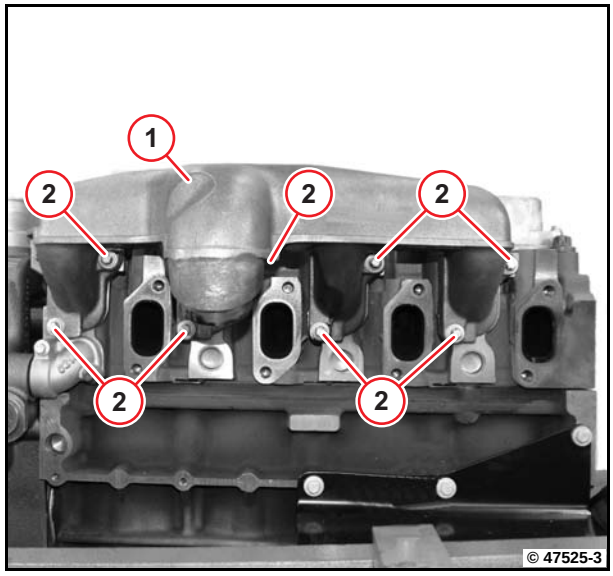
  21 Nm

- Install the exhaust pipe.

  W 06-01-05

- Install the turbocharger.

  W 06-06-04



6

Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A06 030	Charge air pipe on cylinder head	Torx screw, coated	Use new screws.	21 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

Removing and installing the turbocharger

Commercial available tools:
– Clamping tongs 9088
– Spring band pliers 9090

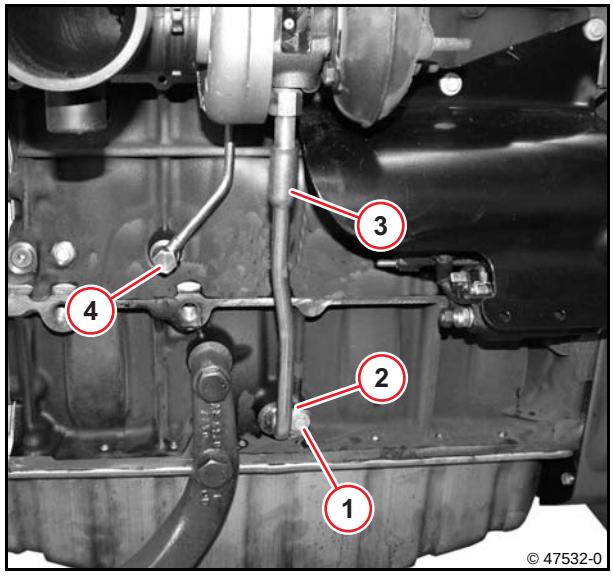
– Lubricating oil
– Fitting compound DEUTZ S1

Attention!
Do not remove the stoppers/caps until immediately before assembly.

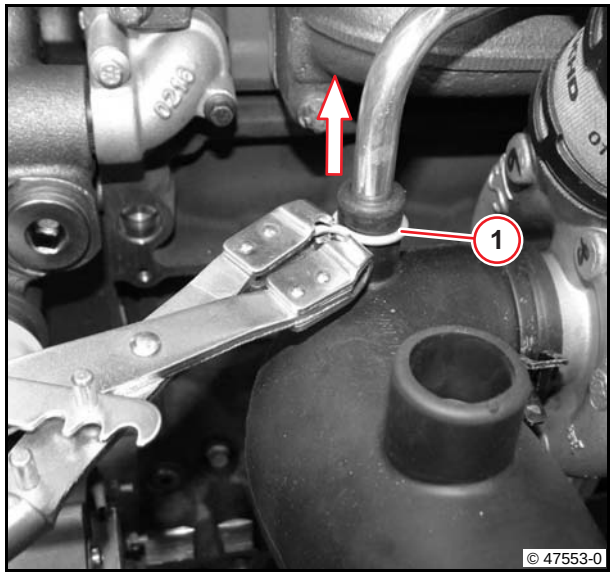
Collect leaking operating substances in suitable vessels and dispose of according to regulations.

Removing turbocharger

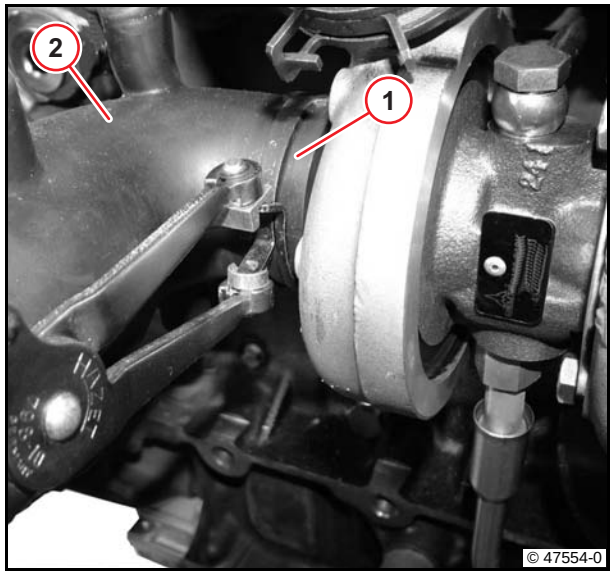
- Unscrew screw (1).
- Remove the holder (2).
- Remove oil return pipe (3).
- Unscrew hollow screw (4).
- Remove sealing rings.



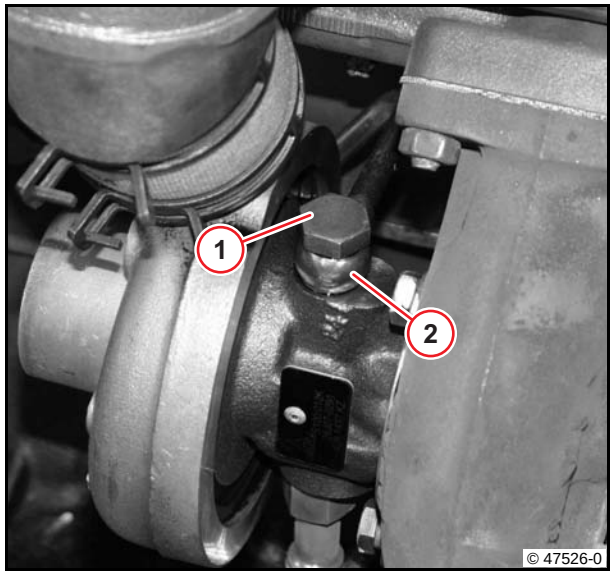
- Loosen hose clip (1) with clamping tongs.
- Pull off hose clip (1) in the direction of the arrow.



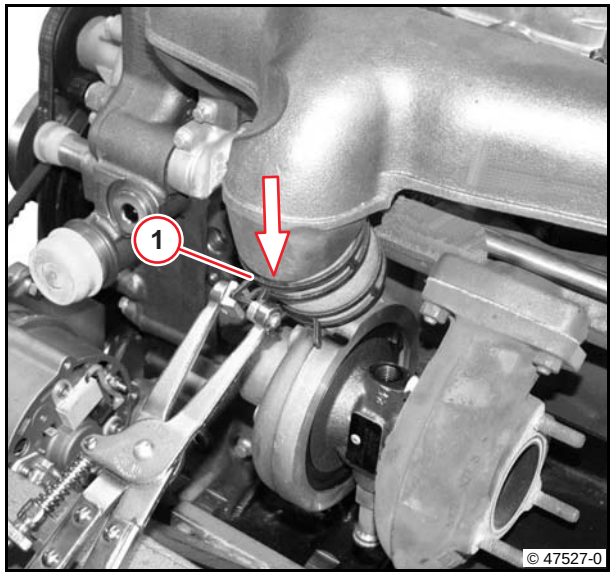
- Loosen spring band clip (1) with spring band pliers.
- Remove reducer (2).



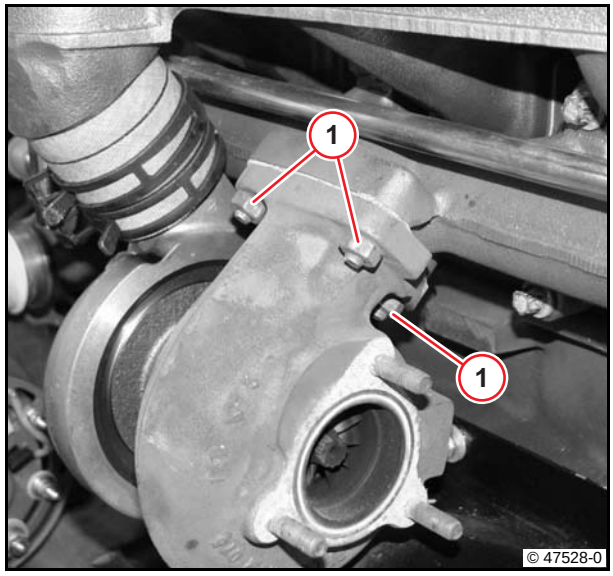
- Unscrew hollow screw (1).
- Remove lubricating oil pipe (2).
- Remove sealing rings.
- Press in stoppers.



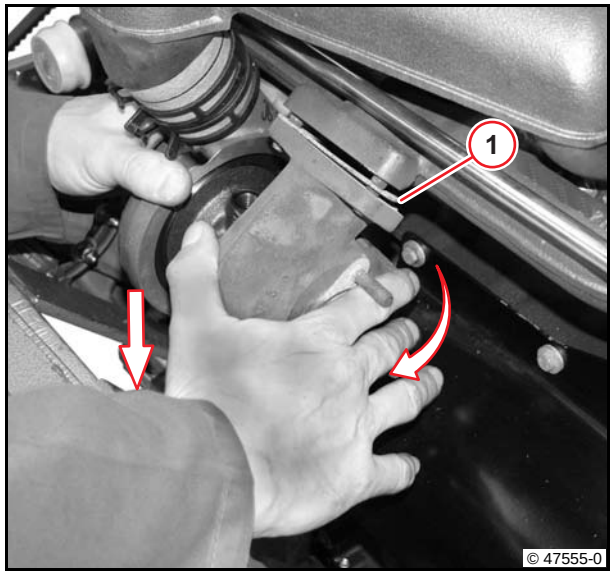
- Loosen spring band clip (1) with spring band pliers.
- Pull off spring band clip (1) in the direction of the arrow.



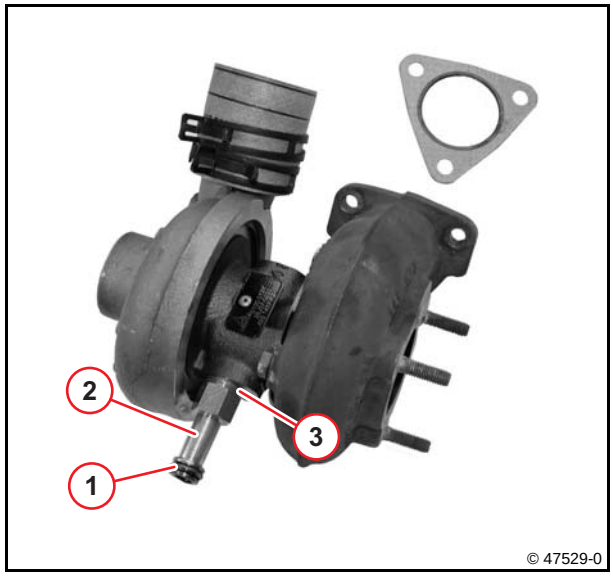
- Unscrew nuts (1).



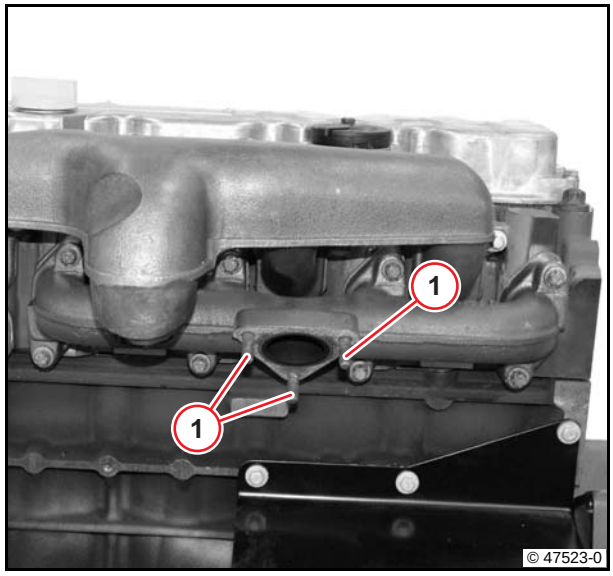
- Remove turbocharger in the direction of the arrow.
- Remove gasket (1).



- Remove the O-ring (1) with the disassembly tool.
- Unscrew screw-in nipple (2).
- Remove sealing ring (3).



- Unscrew studs (1).
- Check components for visible signs of wear.



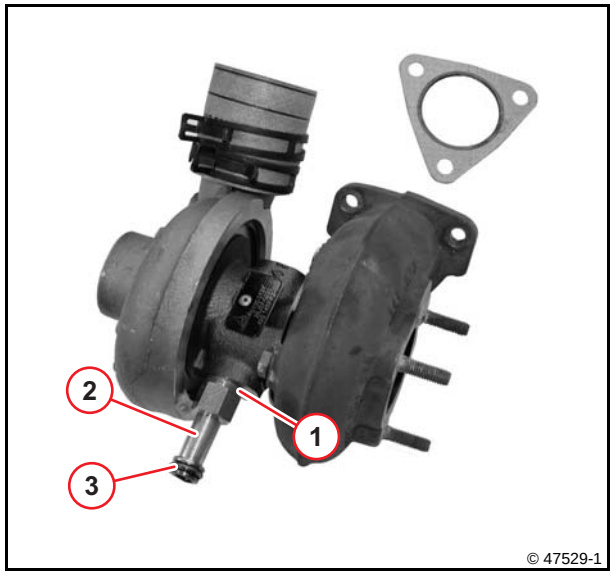
6

Installing the turbocharger

- Mount sealing ring (1).
- Tighten screw-in nipple (2).

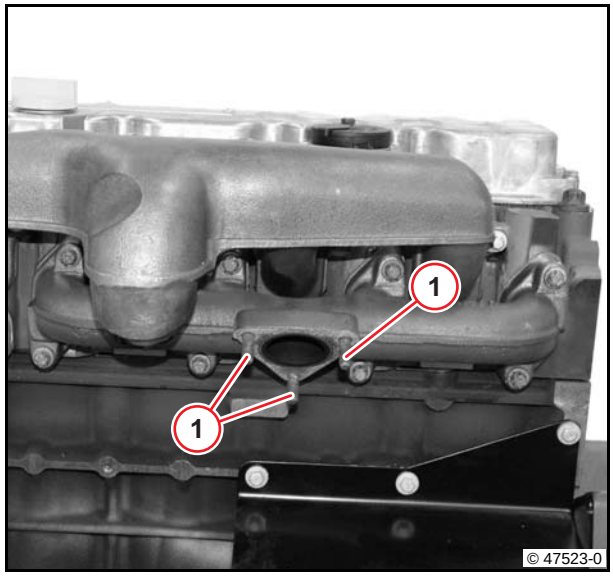
  40 Nm

- Insert new O-ring (3).

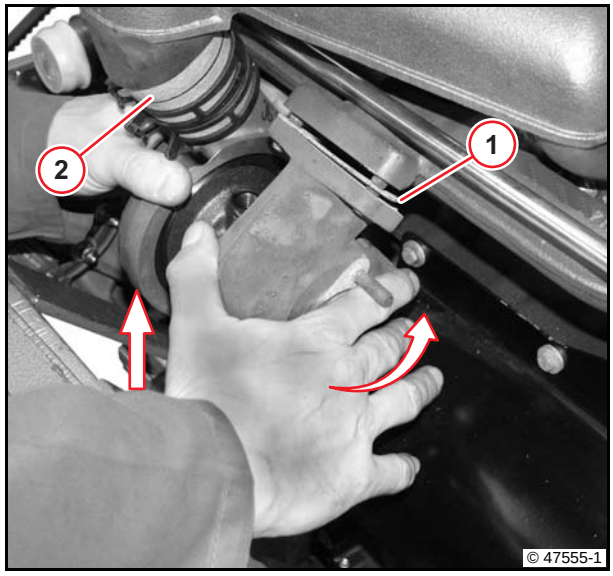


- Clean sealing surfaces.
- Coat pin bolts with mounting compound.
- Screw in studs (1).
- Tighten all pin bolts (1).

  12 Nm

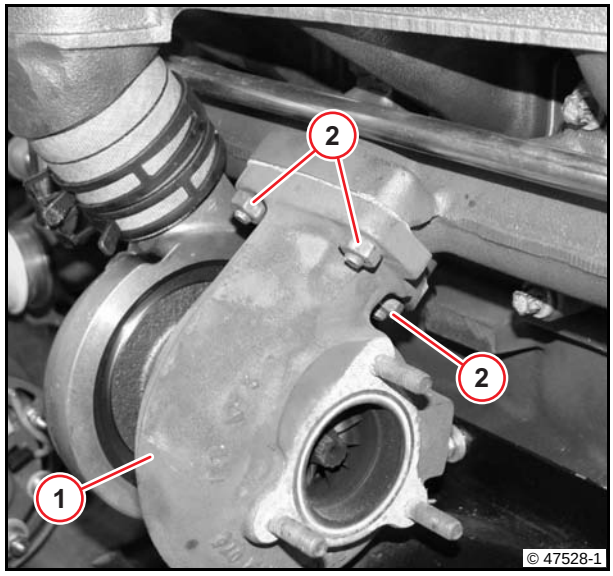


- Mount gasket (1).
- Plug in the tubing connection (2).
- Insert turbocharger in the direction of the arrow.

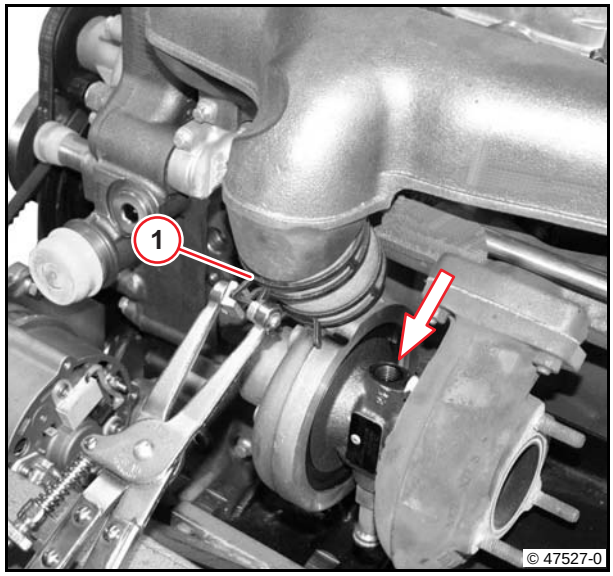


- Mount turbocharger (1).
- Turn on new nuts (2).
- Tighten nuts (2).

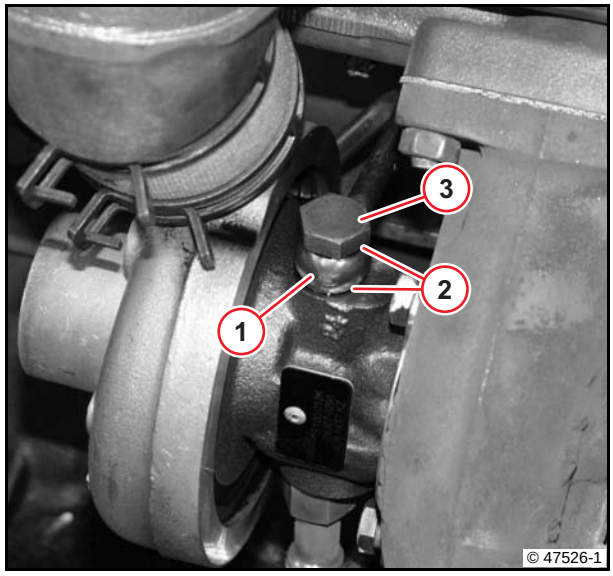
21 Nm



- Position the spring band clip (1) with the spring band pliers.
- Pull out stoppers.
- Fill in clean lubricating oil (arrow).

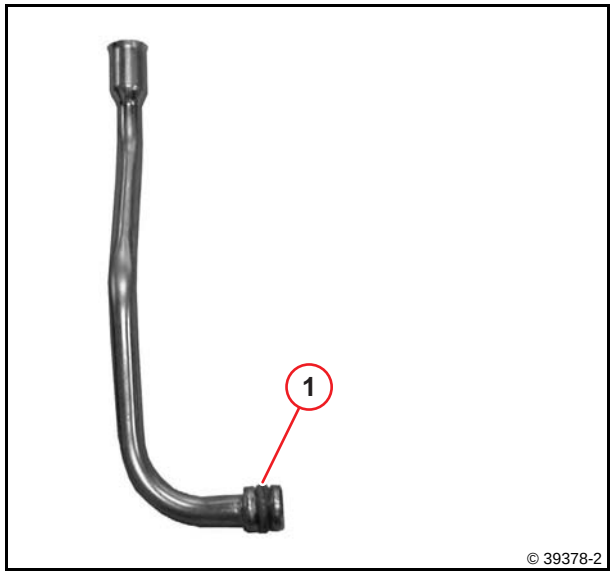


- Mount lubrication oil line (1).
- Mount sealing rings (2).
- Screw on hollow screw (3).



6

- Insert new O-ring (1).
- Lightly oil new O-ring (1).

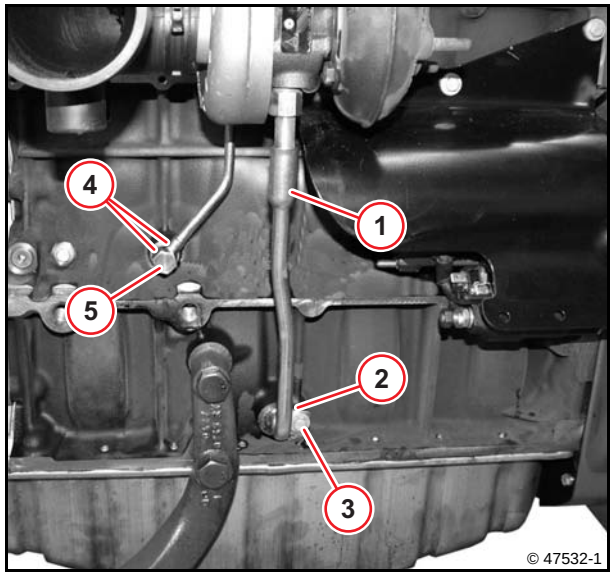


- Mount oil return pipe (1).
- Mount holder (2).
- Tighten screw (3).

8.5 Nm

Attention!
Install tension-free.

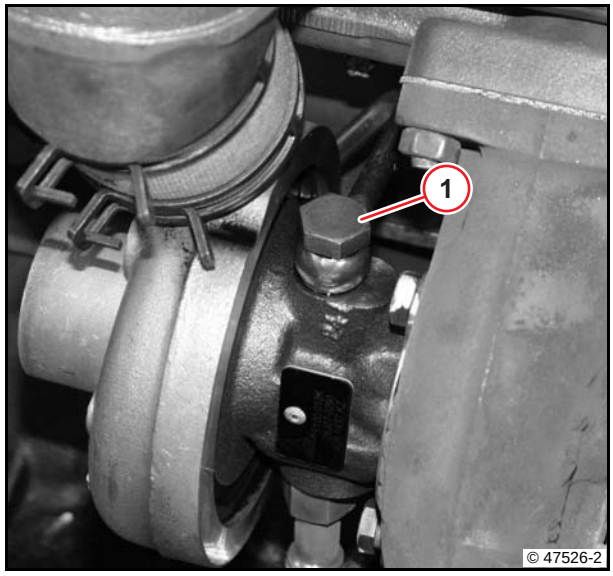
- Mount new sealing rings (4).
- Tighten hollow screw (5).



Attention!
Install tension-free.

- Tighten hollow screw (1).

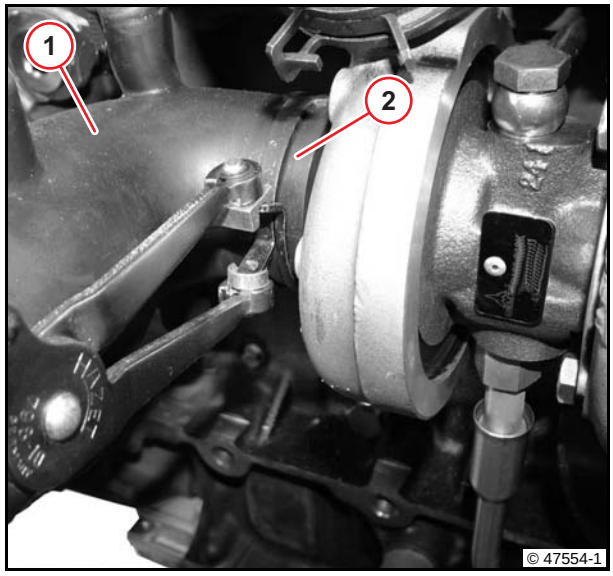
  29 Nm



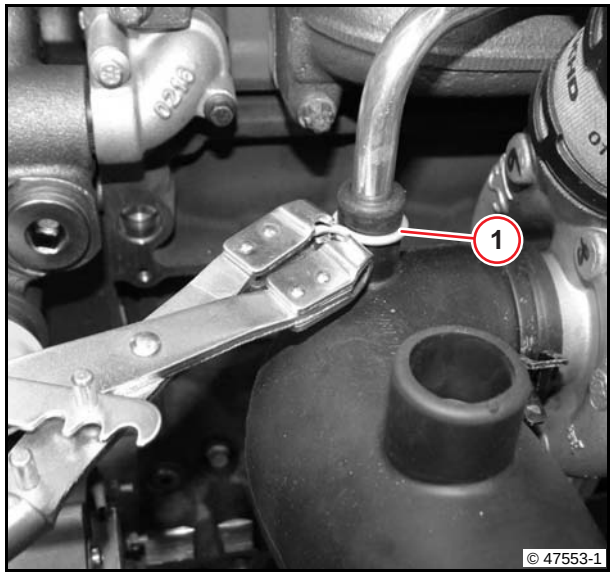
- Mount the reducer (1).

Attention!
Install tension-free.

- Position spring band clip (2) with spring band pliers.



- Position hose clip (1) with clamping tongs.



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A06 004	Pin bolts on exhaust pipe	coated	Use new pin bolts	12 Nm
A06 020	Turbocharger on exhaust pipe	M8		21 Nm
A08 042	Lubricating oil pipe on turbocharger / crankcase	Hollow screw	Replace sealing rings	29 Nm
A08 044	Oil return line, hex spuds to turbocharger	M16x1.5	Use new sealing ring	40 Nm
A08 049	Holder oil return line on crankcase	Torx, M6x14-8.8		8.5 Nm

6

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing the intake manifold

Commercial available tools:
– Torx tool set 8189

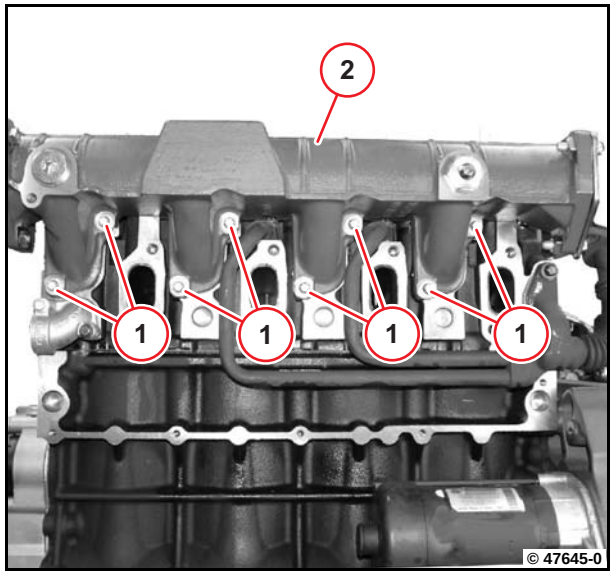
– W 06-01-05

Removing the intake manifold

- Remove the exhaust pipe.

  W 06-01-05

- Unscrew all screws (1).
- Remove intake manifold (2).
- Remove seals.



- Clean sealing surfaces.

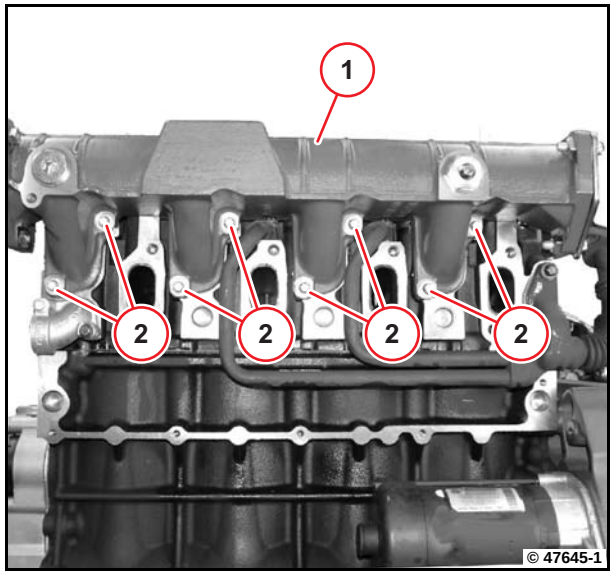
Installing the intake manifold

- Mount new gaskets.
- Mount intake manifold (1).
- Tighten new screws (2) alternately working from the centre to the outside.

  21 Nm

- Install the exhaust pipe.

  W 06-01-05



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A06 030	Air suction intake pipe on cylinder head	Torx screw, coated	Use new screws.	21 Nm

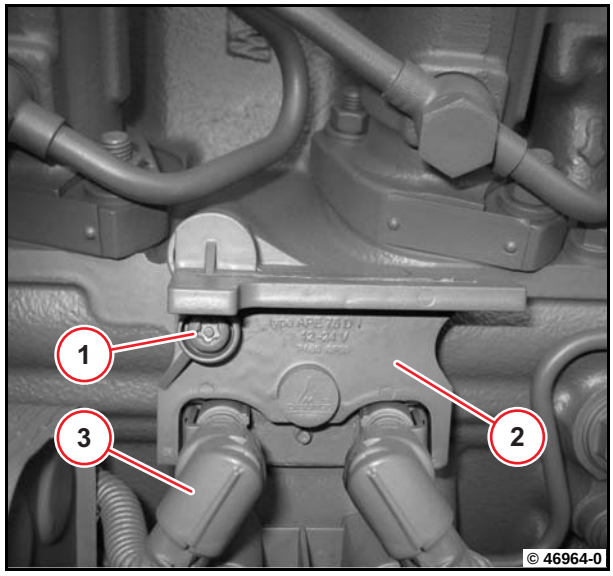
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing the exhaust gas return valve

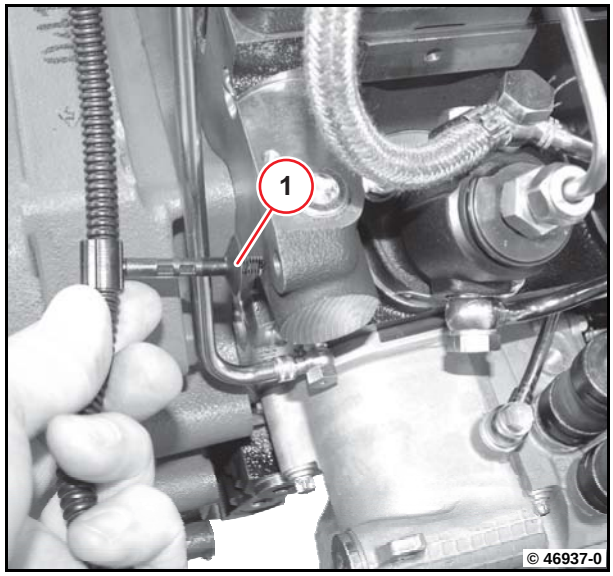
Commercial available tools:
– Special bit, 70 mm long. 9120

Removing the exhaust gas return valve

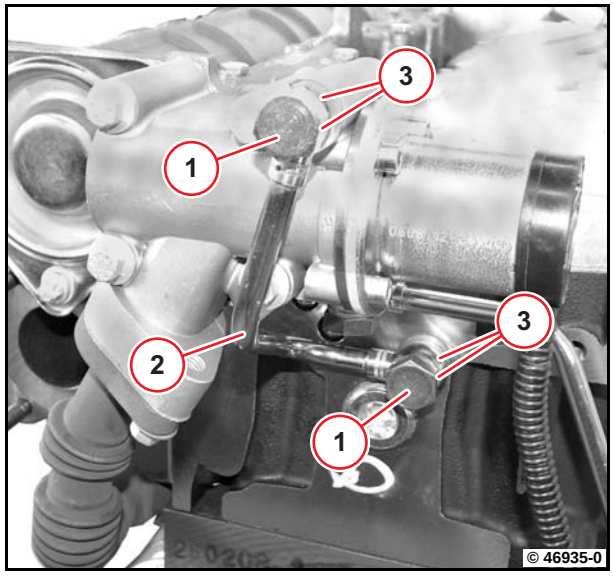
- Unscrew screw (1) with special bit.
- Remove safety cover (2).
- Unlock cable plug (3) and remove.



- Pull out pipe holder (1).

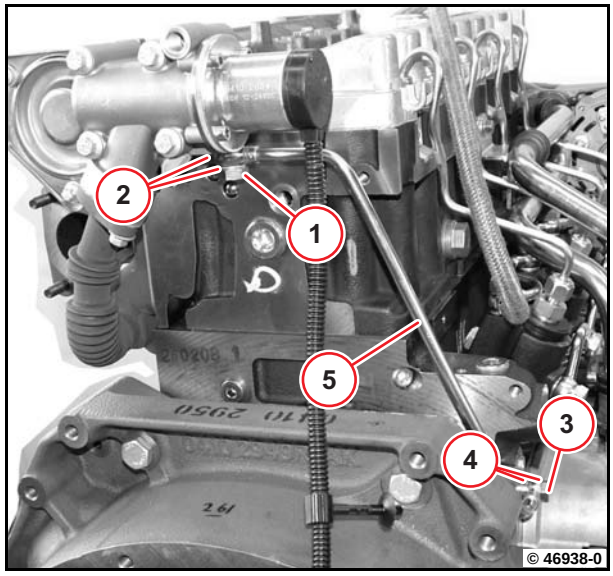


- Unscrew hollow screws (1).
- Remove pipe (2).
- Remove sealing rings (3).

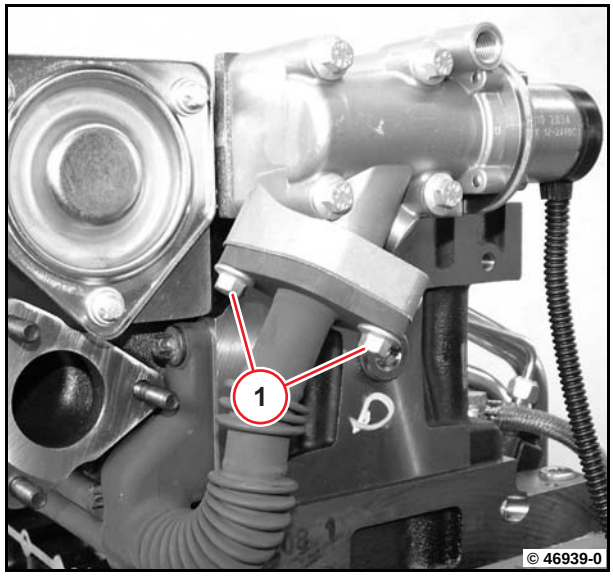


6

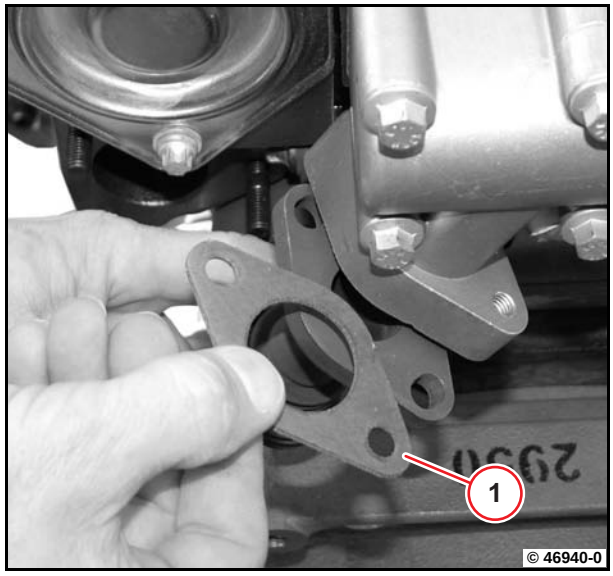
- Unscrew hollow screw (1).
- Remove sealing rings (2).
- Unscrew hollow screw (3).
- Remove sealing rings (4).
- Remove pipe (5).



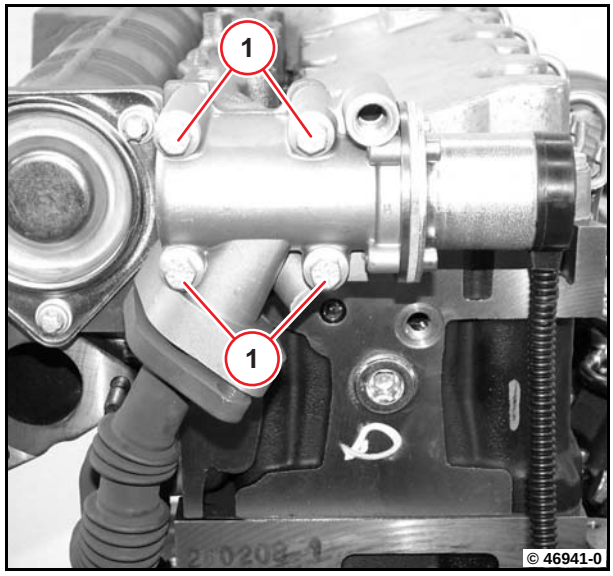
- Unscrew screws (1).



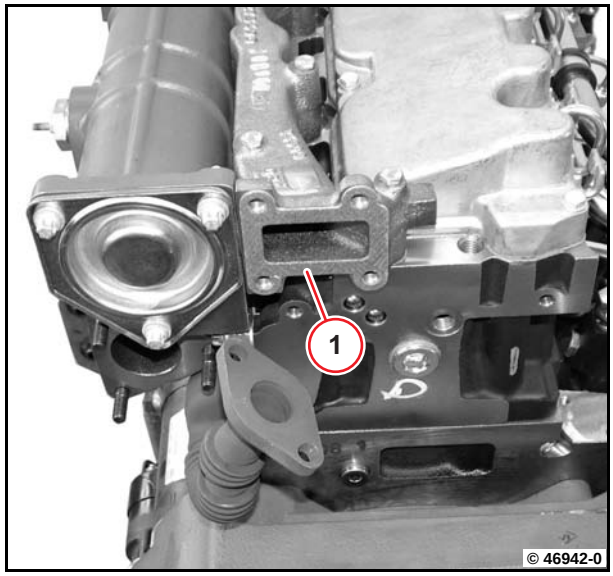
- Remove gasket (1).



- Unscrew screws (1).
- Remove the exhaust gas return valve.



- Remove gasket (1).

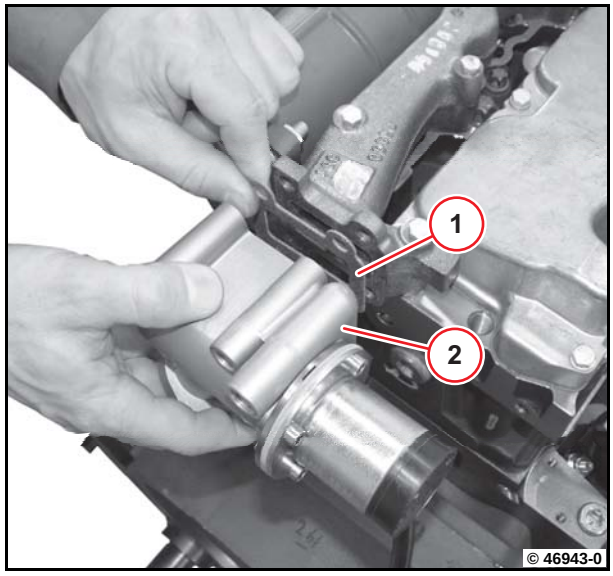


- Visually inspect the components.

6

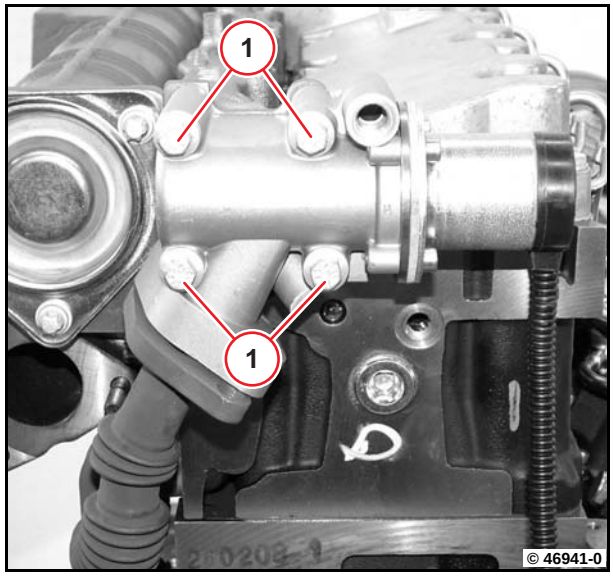
Installing the exhaust gas return valve

- Clean sealing surfaces.
- Mount gasket (1).
- Mount exhaust gas return valve (2).



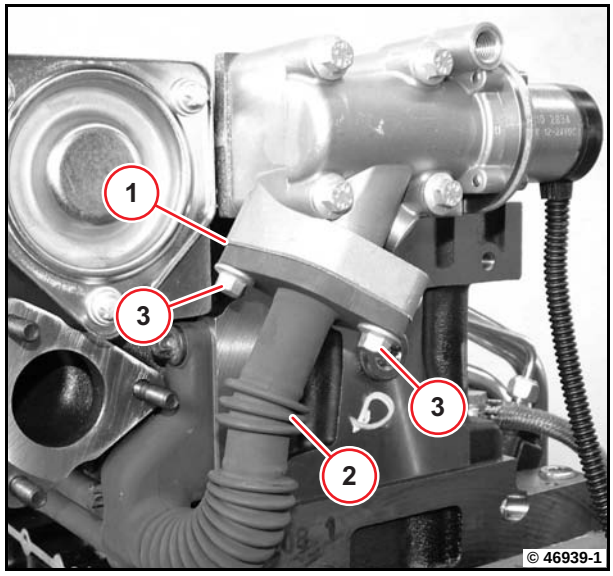
- Tighten screws (1).
- Tighten screws (1).

20 Nm



- Clean sealing surfaces.
- Mount gasket (1).
- Mount exhaust gas collection pipe (2).
- Fasten screws (3).
- Tighten screws (3).

20 Nm

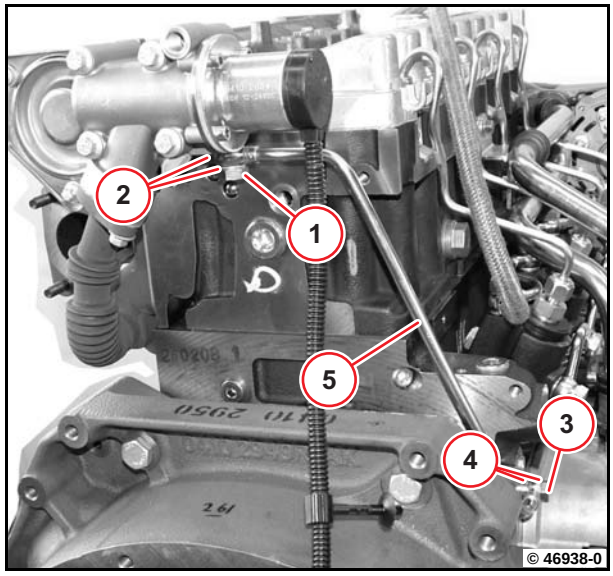


- Insert pipe (5).
- Mount new sealing rings (4).
- Screw on hollow screw (3).
- Mount sealing rings (2).
- Tighten hollow screw (1).

29 Nm

- Tighten hollow screw (3).

12 Nm

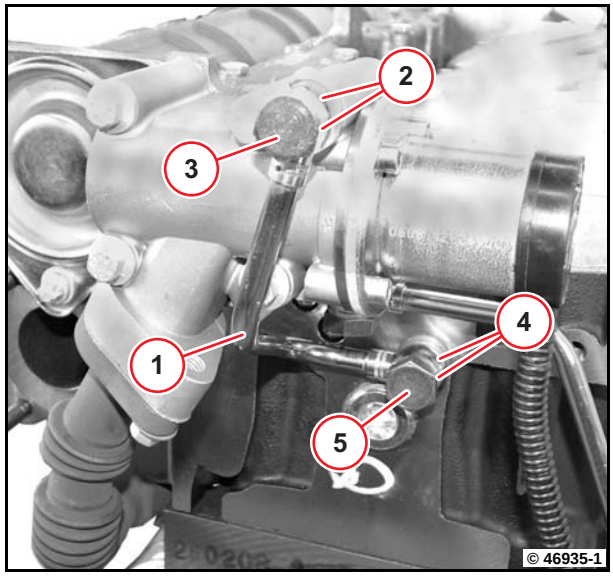


- Insert pipe (1).
- Mount sealing rings (2).
- Screw on hollow screw (3).
- Mount new sealing rings (4).
- Turn in hollow screw (5).
- Tighten hollow screw (5).

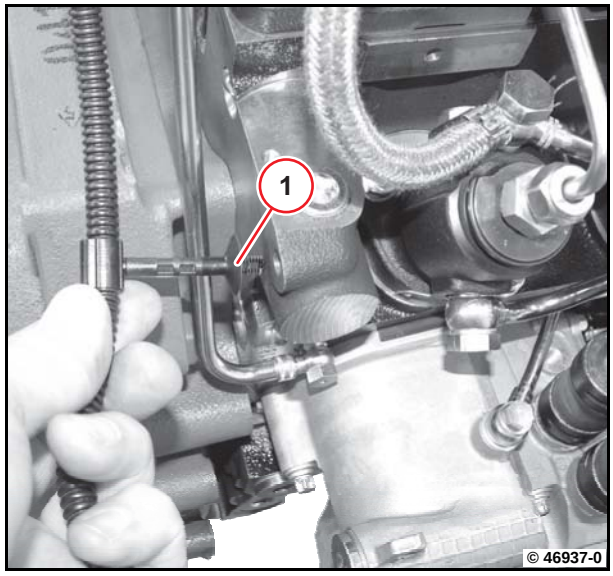
29 Nm

- Tighten hollow screw (3).

29 Nm



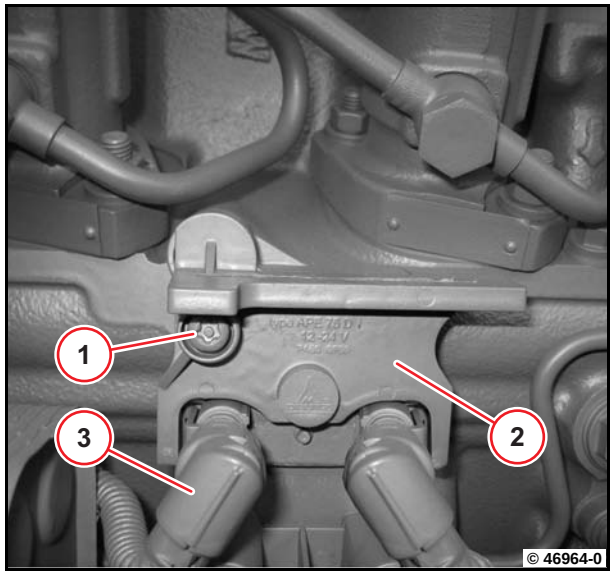
- Press in pipe holder (1).



6

- Plug in the cable plug (3).
- Mount the safety cover (2).
- Fasten screw (1).
- Tighten screw (1) with special bit.

  8 Nm



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A06 057	Pipe to exhaust gas return valve/cylinder head (cooling - intake)	Hollow screw M12x1.5		29 Nm
A06 062	Exhaust return pipe to exhaust return valve	M8x65-10.9		20 Nm
A06 063	Exhaust gas collection pipe to exhaust gas return valve			20 Nm
A06 071	Pipe to crankcase (exhaust gas return - cooling - return)	Hollow screw M8x1		12 Nm
A06 072	Pipe to exhaust gas return valve (exhaust gas return - cooling - return)	Hollow screw M12x1.5		29 Nm
A06 074	Exhaust gas return pipe to cylinder head (exhaust gas return)			8.5 Nm
A06 075	Safety cover on sensor housing (exhaust gas return)	Locking screw Torx-Plus 30IPR		8 Nm

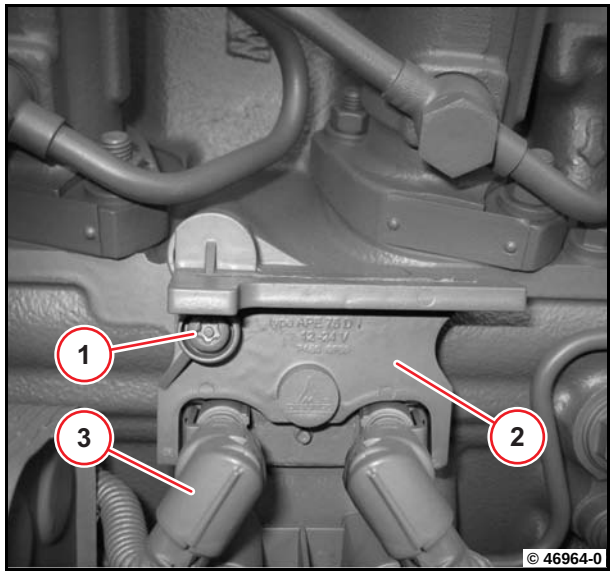
For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing the exhaust gas return pipe

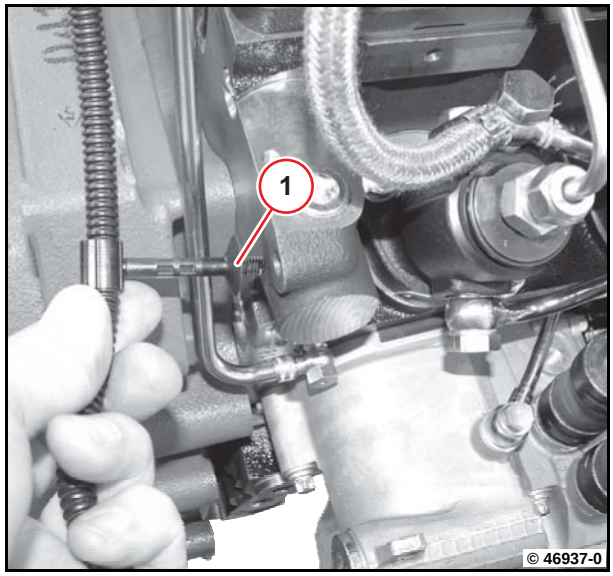
Commercial available tools:
– Special bit, 70 mm long. 9120

Removing the exhaust gas return pipe

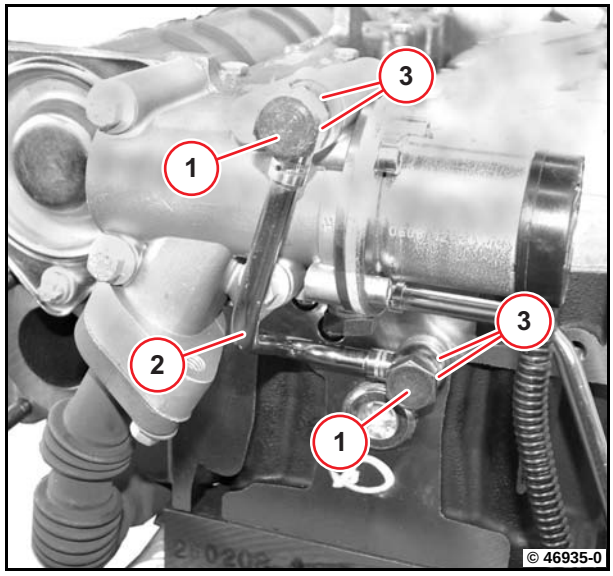
- Unscrew screw (1).
- Remove safety cover (2).
- Unlock cable plug (3) and remove.



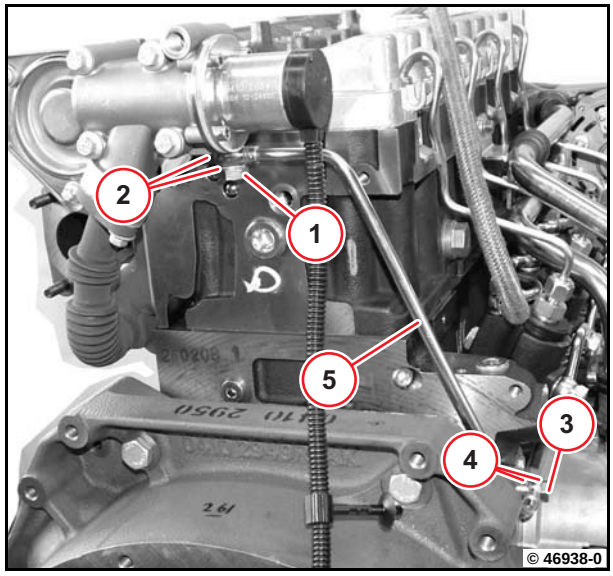
- Pull out pipe holder (1).



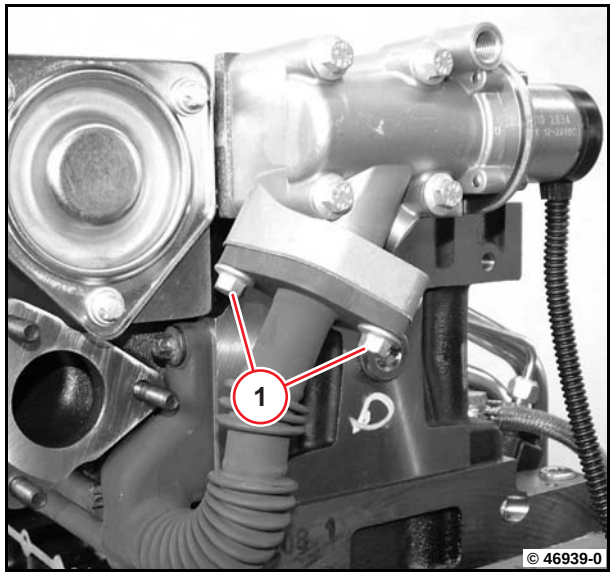
- Unscrew hollow screws (1).
- Remove pipe (2).
- Remove sealing rings (3).



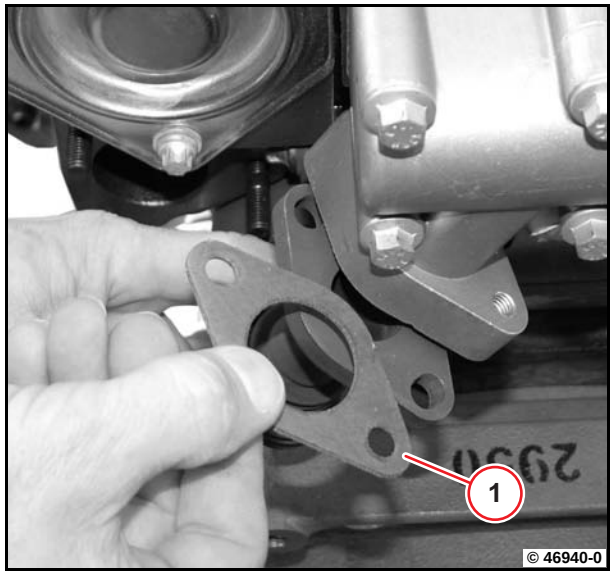
- Unscrew hollow screw (1).
- Remove sealing rings (2).
- Unscrew hollow screw (3).
- Remove sealing rings (4).
- Remove pipe (5).



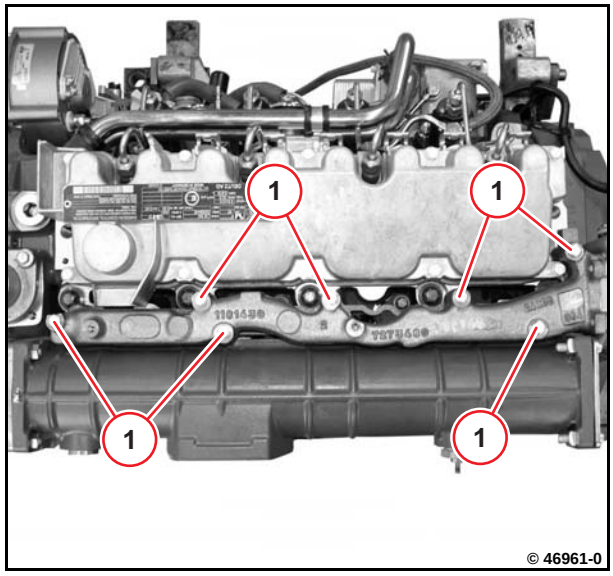
- Unscrew screws (1).



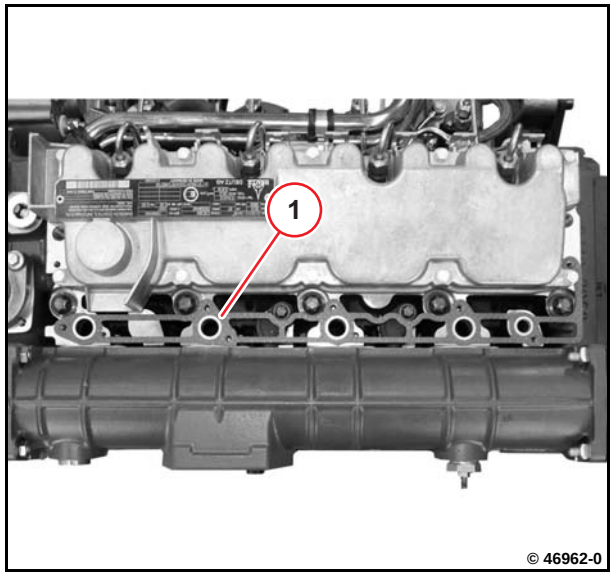
- Remove gasket (1).



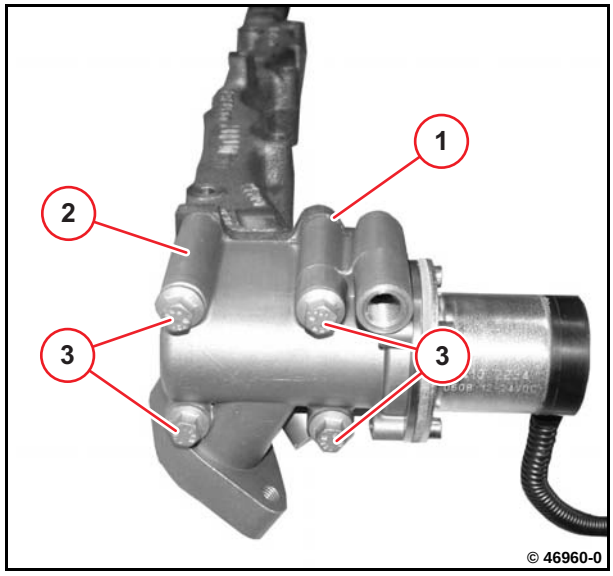
- Unscrew screws (1).
- Remove the exhaust return pipe.



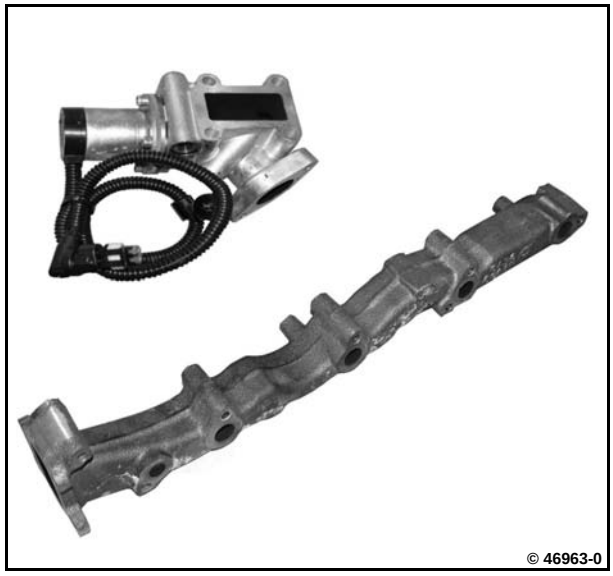
- Remove gasket (1).



- Unscrew screws (3).
- Remove exhaust gas return valve (2).
- Remove gasket (1).



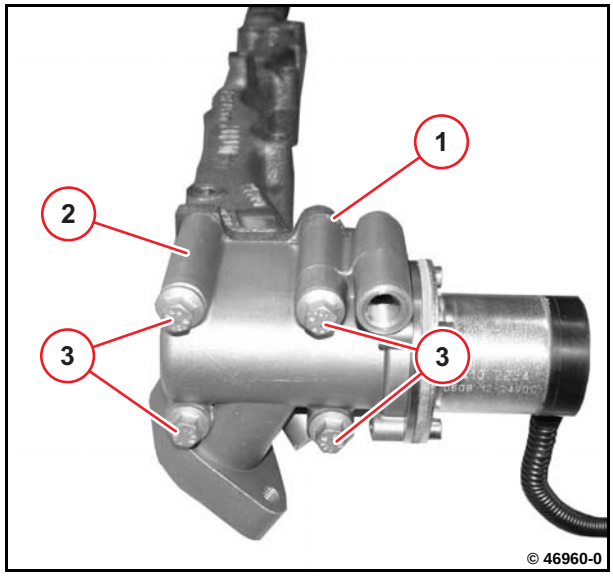
- Visually inspect the components.



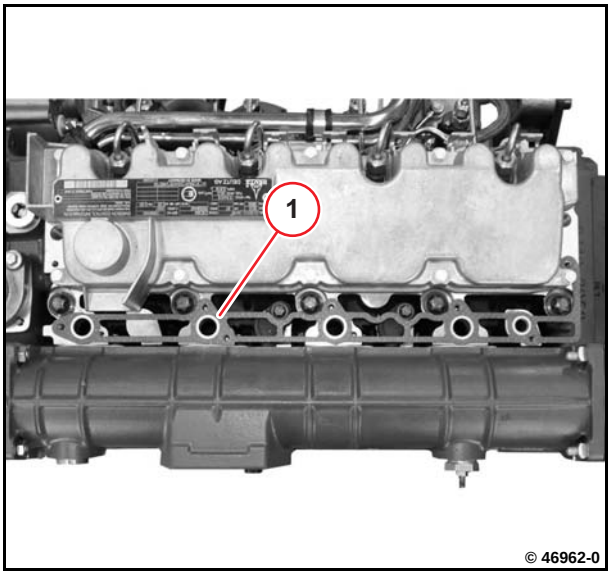
Installing the exhaust gas return pipe

- Clean all sealing surfaces.
- Mount gasket (1).
- Mount exhaust gas return valve (2).
- Fasten screws (3).
- Tighten screws (3).

20 Nm

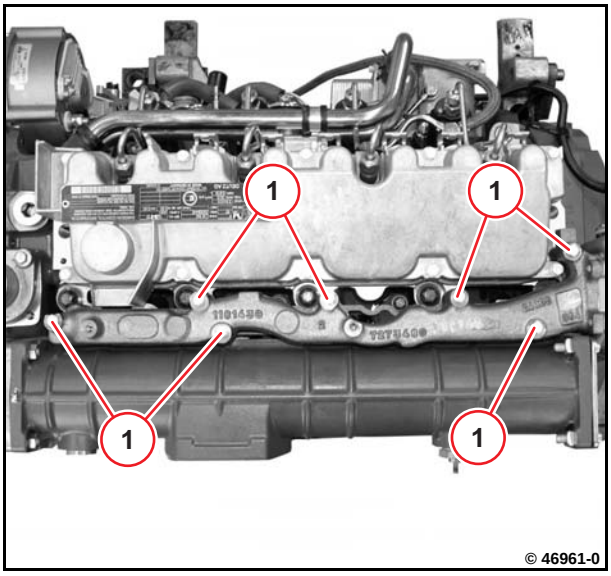


- Clean all sealing surfaces.
- Mount gasket (1).



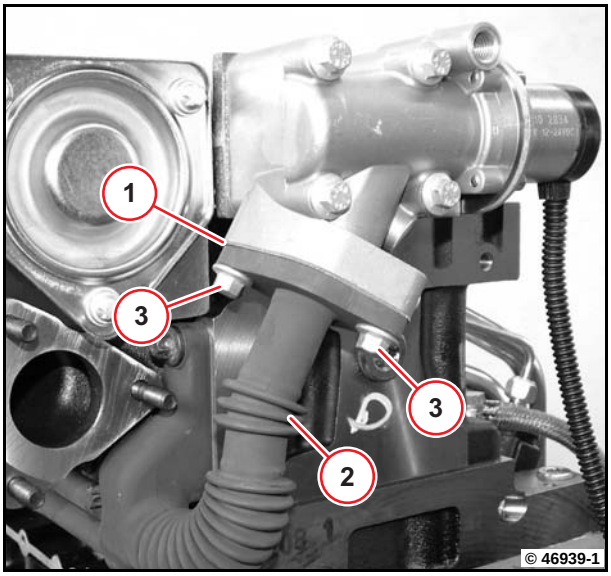
- Install the exhaust gas return pipe.
- Tighten screws (1).
- Tighten screws (1).

8.5 Nm



- Clean sealing surfaces.
- Mount gasket (1).
- Mount exhaust gas collection pipe (2).
- Fasten screws (3).
- Tighten screws (3).

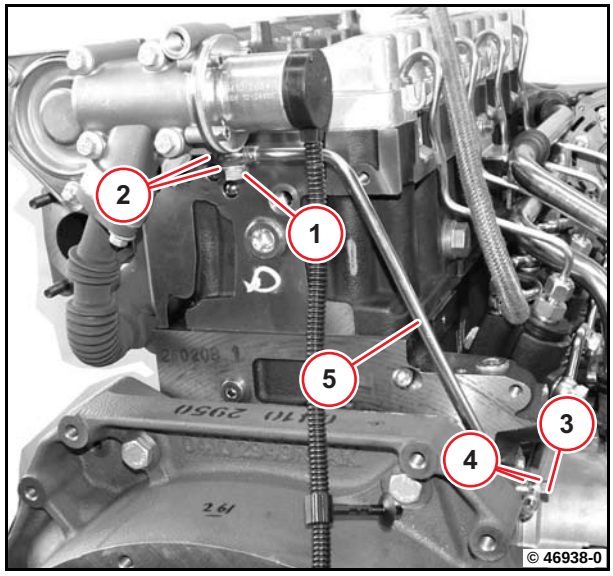
20 Nm



- Insert pipe (5).
- Mount new sealing rings (4).
- Screw on hollow screw (3).
- Mount sealing rings (2).
- Tighten hollow screw (1).

  29 Nm
- Tighten hollow screw (3).

  12 Nm



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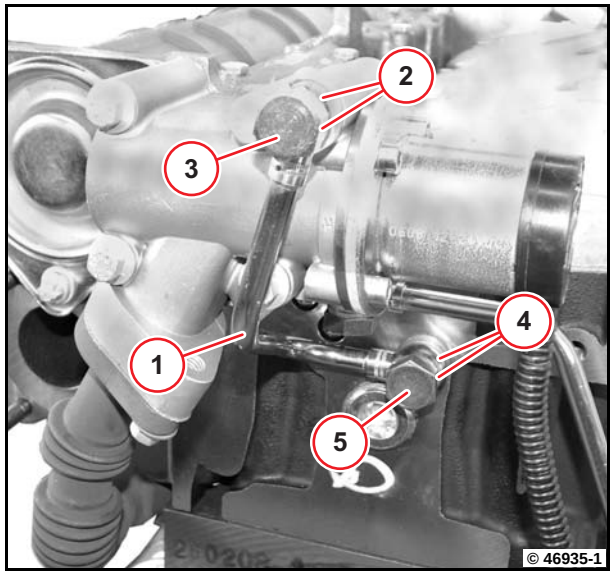
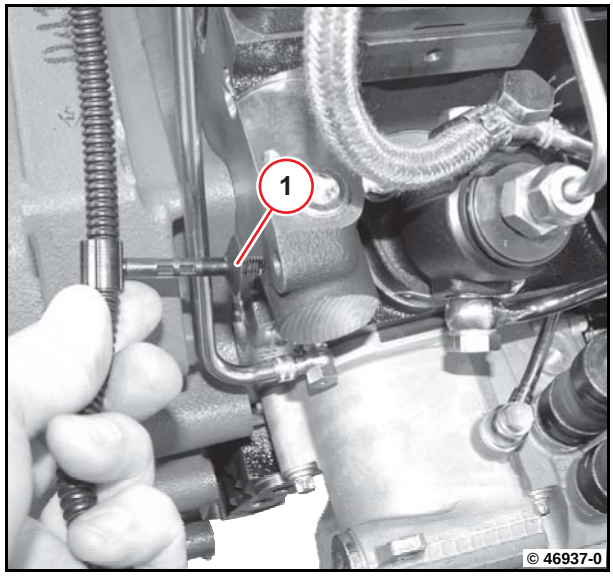
- Insert pipe (1).
- Mount sealing rings (2).
- Screw on hollow screw (3).
- Mount new sealing rings (4).
- Turn in hollow screw (5).
- Tighten hollow screw (5).

  29 Nm
- Tighten hollow screw (3).

  29 Nm

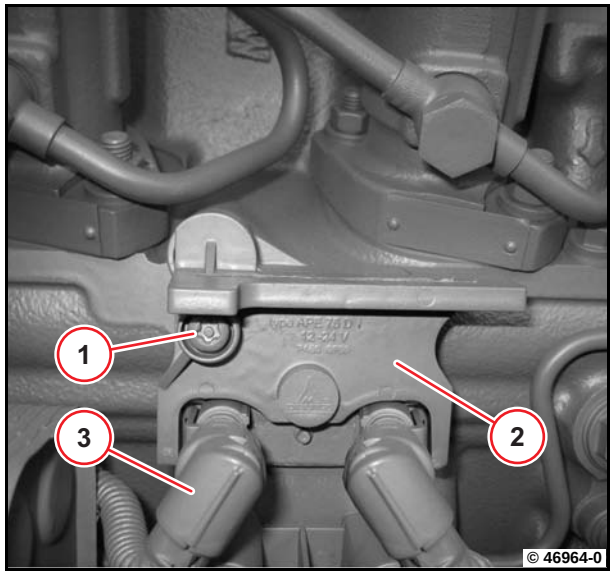


- Press in pipe holder (1).



- Plug in the cable plug (3).
- Mount the safety cover (2).
- Fasten screw (1).
- Tighten screw (1).

  8 Nm



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A06 057	Pipe to exhaust gas return valve/cylinder head (cooling - intake)	Hollow screw M12x1.5		29 Nm
A06 062	Exhaust return pipe to exhaust return valve	M8x65-10.9		20 Nm
A06 063	Exhaust gas collection pipe to exhaust gas return valve			20 Nm
A06 071	Pipe to crankcase (exhaust gas return - cooling - return)	Hollow screw M8x1		12 Nm
A06 072	Pipe to exhaust gas return valve (exhaust gas return - cooling - return)	Hollow screw M12x1.5		29 Nm
A06 074	Exhaust gas return pipe to cylinder head (exhaust gas return)			8.5 Nm
A06 075	Safety cover on sensor housing (exhaust gas return)	Locking screw Torx-Plus 30IPR		8 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing the exhaust gas collection pipe (Exhaust gas recirculation)

Commercial available tools:
– Cleaning brush 8167

– W 06-01-05
– W 06-09-07

Remove exhaust gas collection pipe

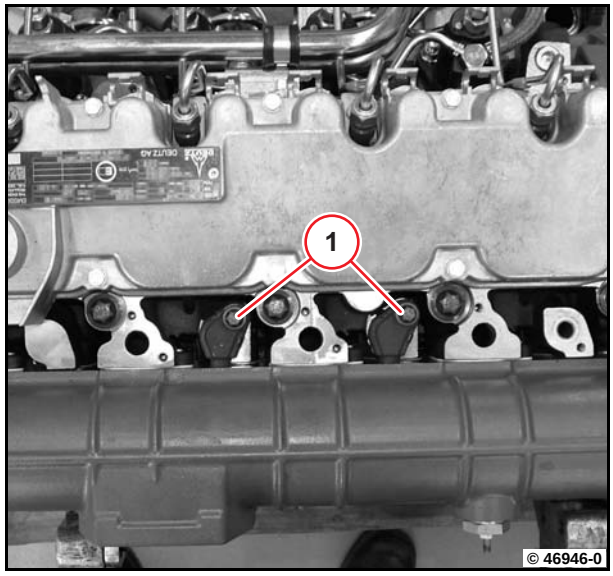
- Remove the exhaust pipe.

  W 06-01-05

- Remove the exhaust return pipe.

  W 06-09-07

- Unscrew screws (1).

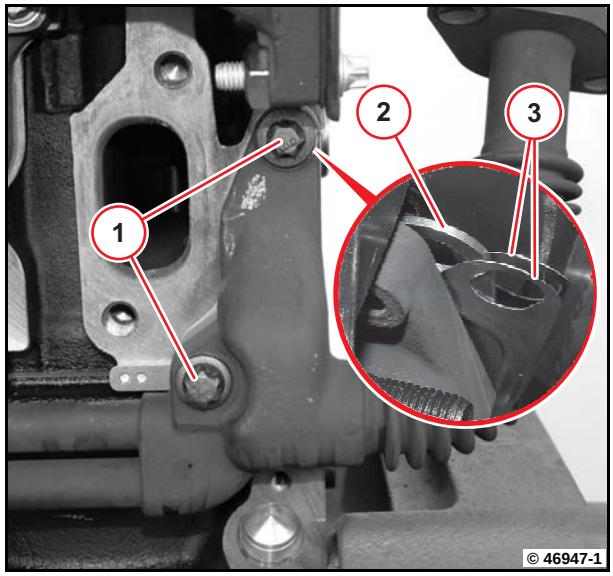


- Unscrew screws (1).

Note different screw lengths.

- Remove throttle (2).
- Remove gaskets (3).

Note installation position.



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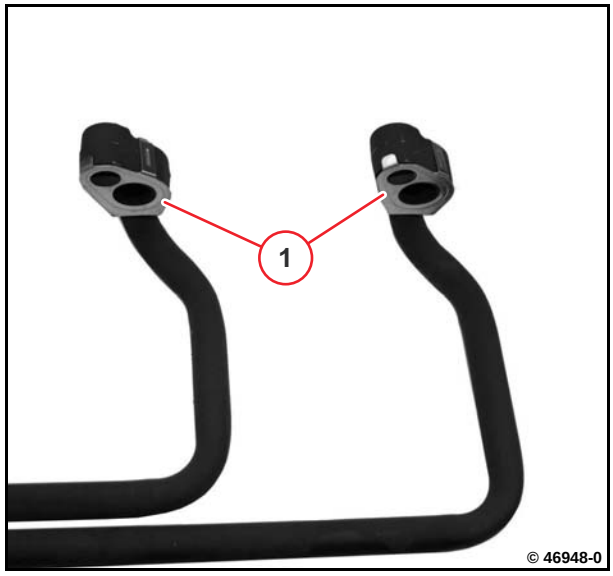
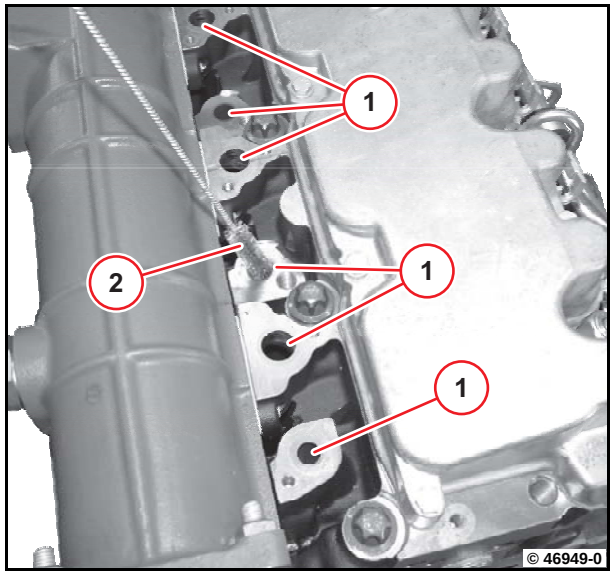
- Remove gaskets (1).

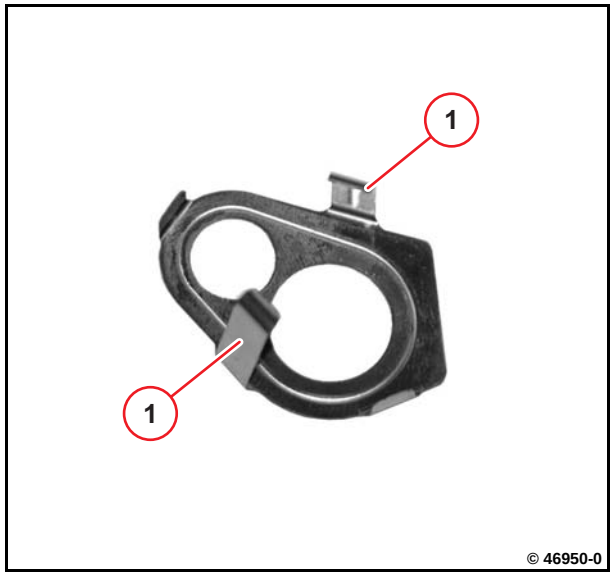


- Clean exhaust channels (1) with cleaning brush (2).
- Clean all sealing surfaces.



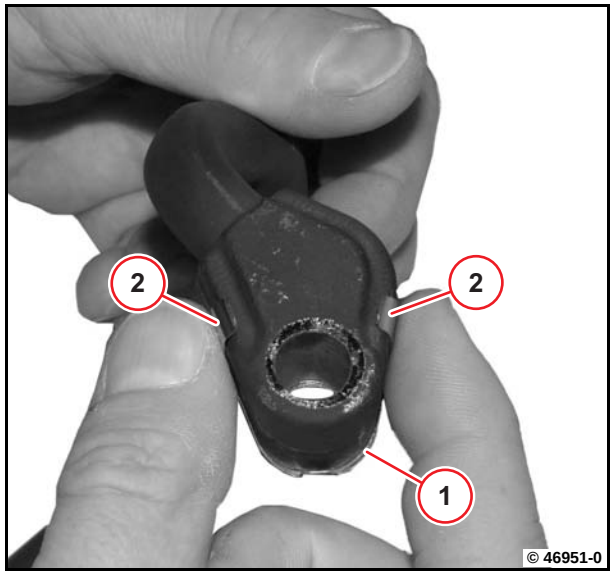
Install exhaust gas collection pipe

- Check that mounting lugs (1) are sufficiently pre-tensioned.



- Mount gasket (1).

Make sure that the installation site of the mounting lugs (2) is in perfect condition.

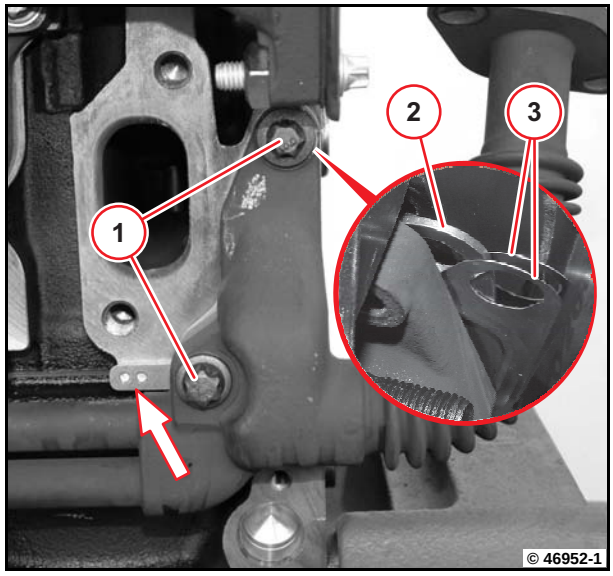


- Mount new gaskets (3).
- Mount new throttle (2).

Note installation position.

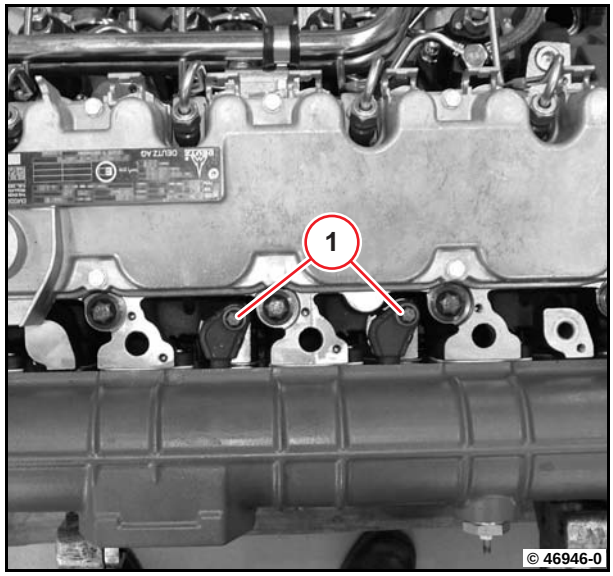
The marking (arrow) on the throttle is dependent on the engine version.

- Insert exhaust gas collection pipe.
- Turn in new screws (1).



- Turn in new screws (1).
- Tighten new screws (1).

55 Nm



- Tighten new screws (1).

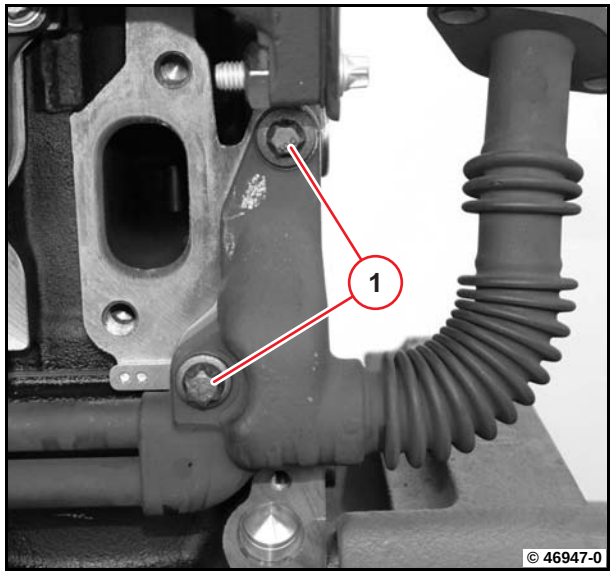
  55 Nm

- Install the exhaust gas return pipe.

  W 06-09-07

- Install the exhaust pipe.

  W 06-01-05



6

Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A06 073	Exhaust gas collection pipe (exhaust gas return) on cylinder head	Torx M10x25-10.9 Torx M10x30-10.9 Torx M10x45-10.9	Use new screws.	55 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing the lifting magnet (Start amount release)

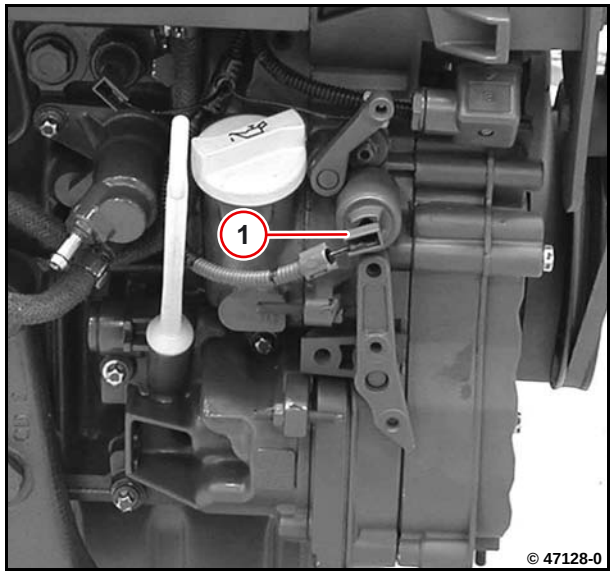
Commercial available tools:
– Plier insert. 8027

Special tools:
– Disassembly tool. 110901

Collect leaking operating substances in suitable vessels and dispose of according to regulations.

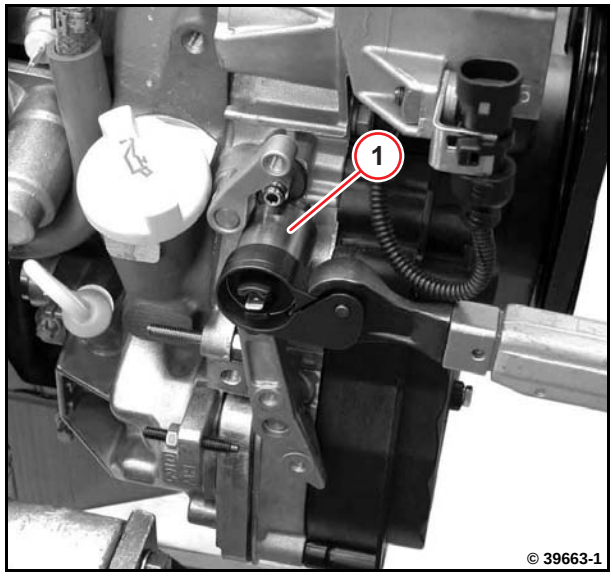
Remove lifting magnet

- Pull out cable plug (1).

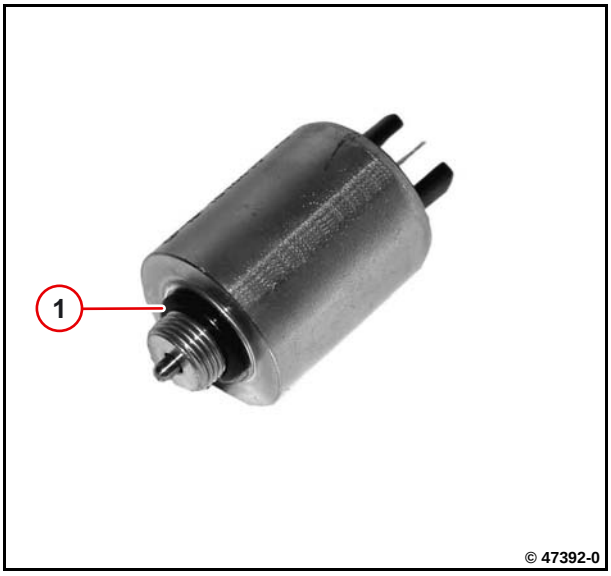


- Unscrew lifting magnet (1) with plier insert.

Note direction of terminal.



- Remove the O-ring (1) with the disassembly tool.
- Visually inspect the components.



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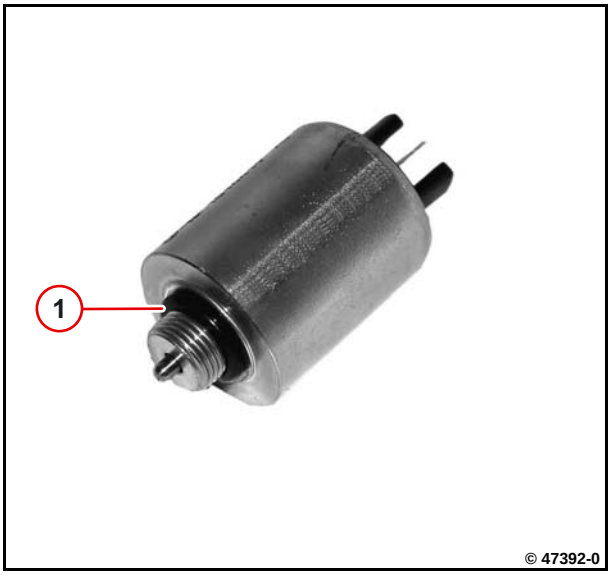
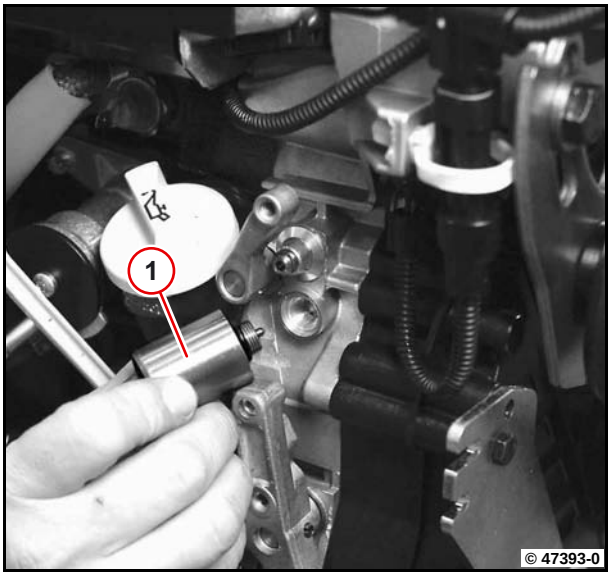
Install lifting magnet

- Insert new O-ring (1).



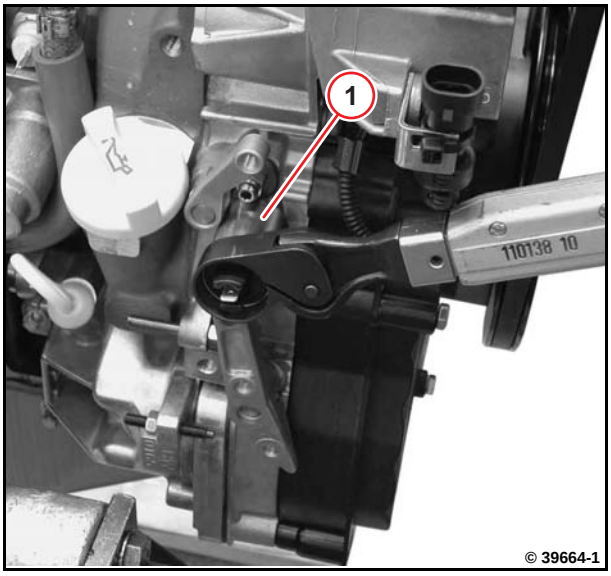
- Clean all sealing surfaces.
- Insert lifting magnet (1).



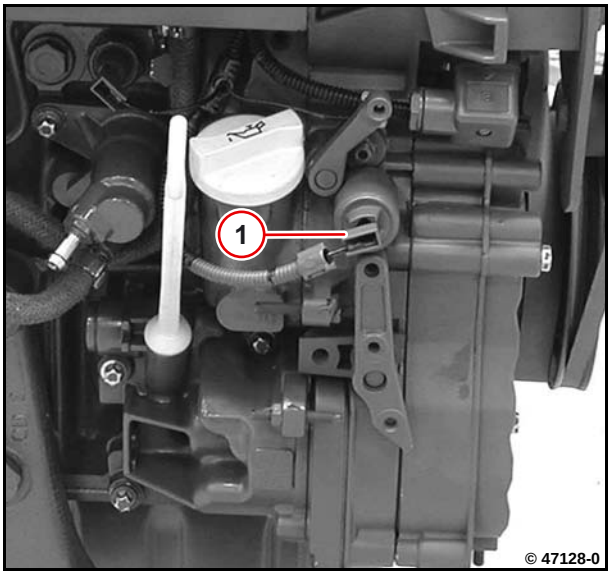
- Tighten lifting magnet (1) with plier insert.

  10 Nm

  Note direction of terminal.



- Plug in the cable plug (1).



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A05 065	Lifting magnet (start amount release) on front cover			10 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Renewing the injection lines

Commercial available tools:
– Dog wrench. 8018

Special tools:
– Plugs/caps 170160

Danger!

Wait 30 seconds after switching off the engine before working on the fuel system.

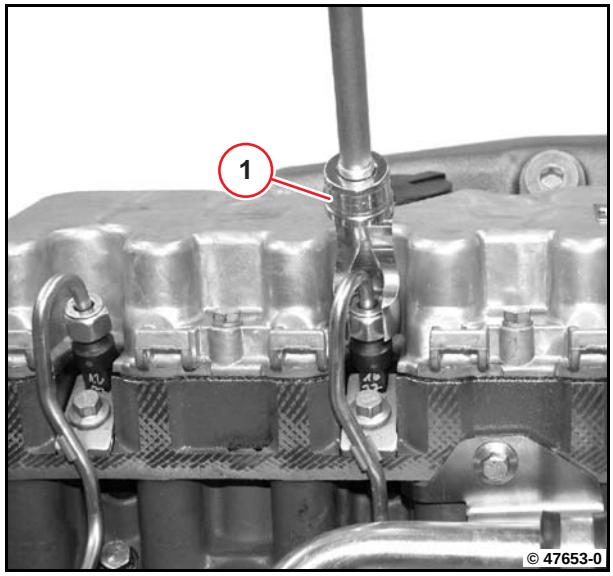
Attention!

Pay attention to utmost cleanliness when working on the fuel system.
Remove residue paint and particles of dirt before removing.
Clean the respective affected parts carefully. Blow damp areas dry with compressed air.
Observe the safety regulations and national specifications for handling fuels.
Close all connections immediately after opening with new, clean plugs/caps.
Do not remove plugs/caps until immediately before assembling.
Collect leaking operating substances in suitable vessels and dispose of according to regulations.
Injection pipes may not be bent.
After all work on the fuel system, it must be bleeded - see the operation manual, chapter "6 Fuel system“.

6

Removing injection pipes

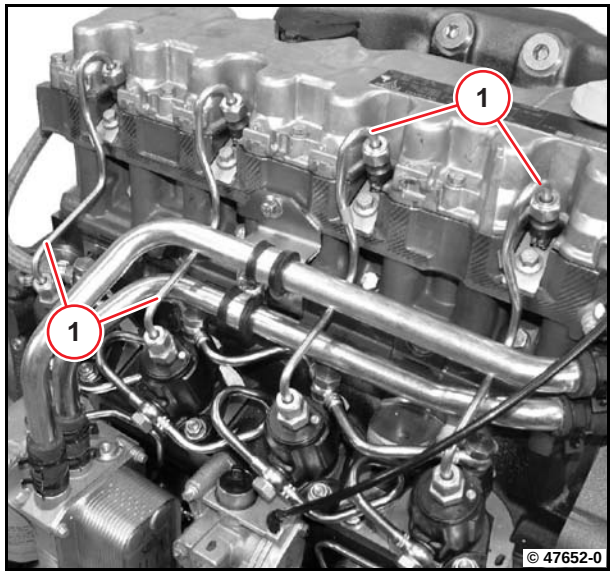
- Unscrew lock nuts (1) with dog wrench.



- Remove injection pipes (1).

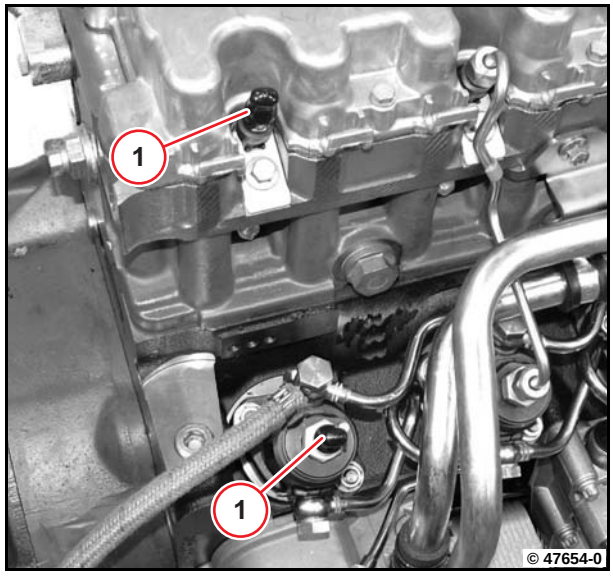
Lay out components in the order in which they should be installed.

Note assignment!



6

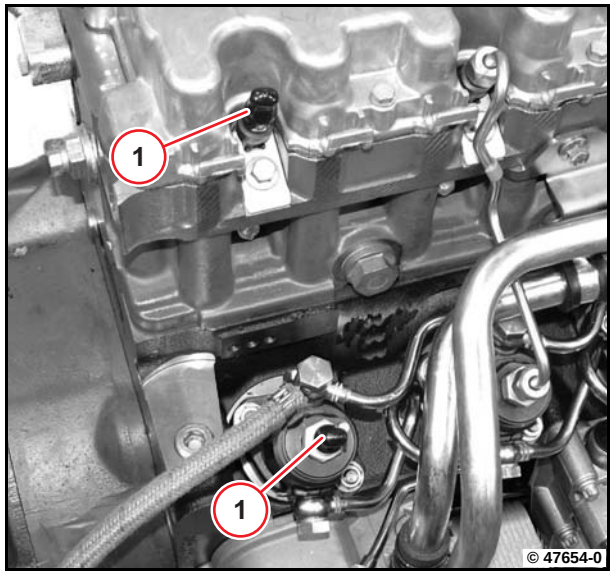
- Mount the caps (1).



- Visually inspect the components.

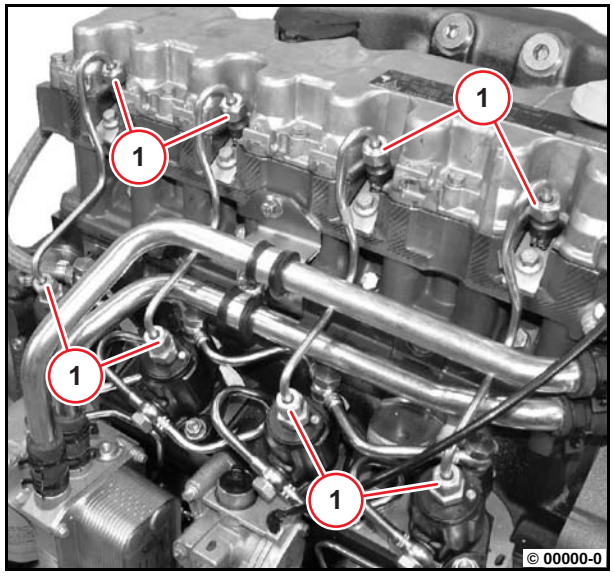
Installing injection pipes

- Pull off the caps (1).
- Mount new injection pipe.



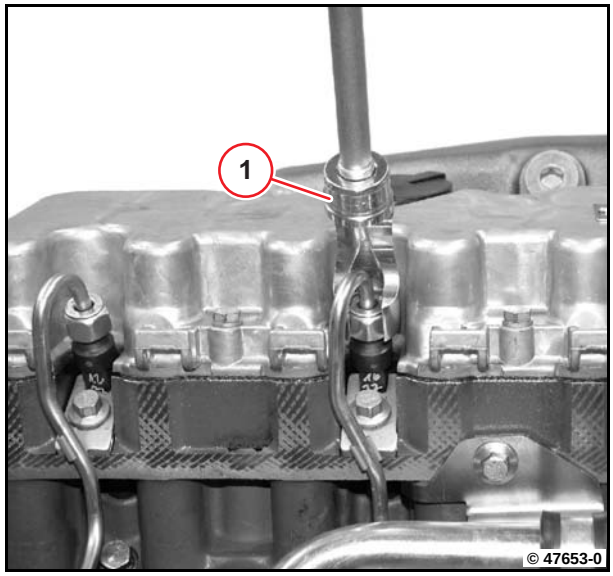
- Screw on union nuts (1).

Attention!
Install injection line without tension.
Note installation position.



- Tighten union nuts (1) with claw spanner.

25 Nm



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A07 003	Injection line on fuel injector / injection pump	M12x1.5		25 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing the fuel injectors

Commercial available tools:
– Assembly pliers. 8024

Special tools:
– Puller. 110090
– Slide hammer 150800
– Plugs/caps 170160

– W 07-03-01
– W07-07-02

Danger!

Wait 30 seconds after switching off the engine before working on the fuel system.

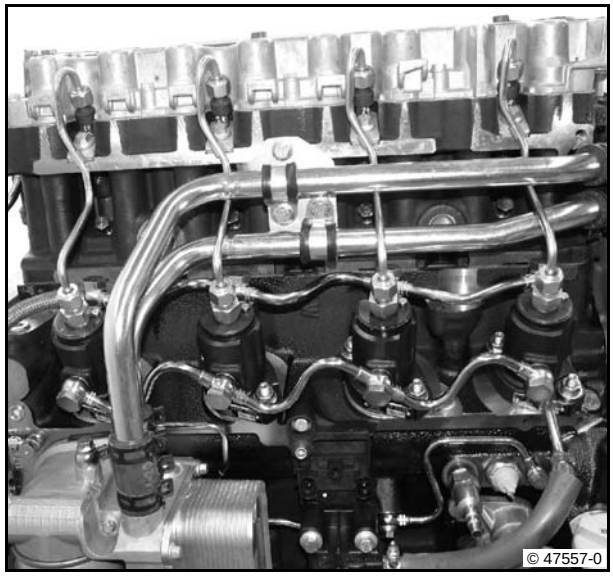
Attention!

Pay attention to utmost cleanliness when working on the fuel system.
Remove residue paint and particles of dirt before removing.
Clean the respective affected parts carefully. Blow damp areas dry with compressed air.
Observe the safety regulations and national specifications for handling fuels.
Close all connections immediately after opening with new, clean plugs/caps.
Do not remove plugs/caps until immediately before assembling.
Collect leaking operating substances in suitable vessels and dispose of according to regulations.
After all work on the fuel system, it must be bleeded - see the operation manual, chapter "6 Fuel system“.

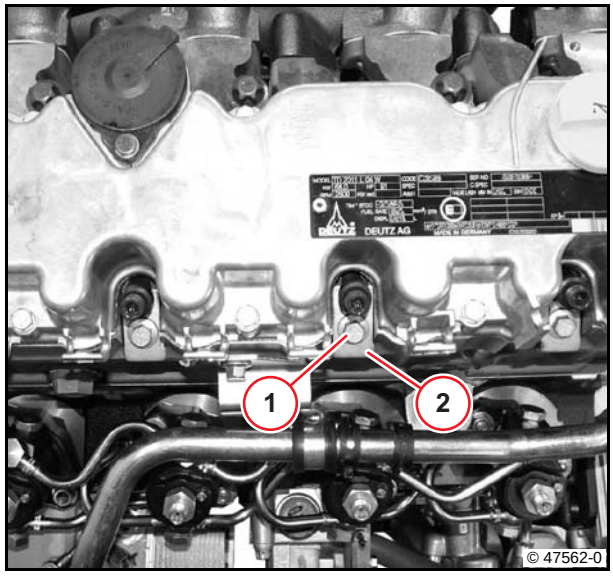
Removing fuel injector

- Remove injection lines.

  W 07-03-01



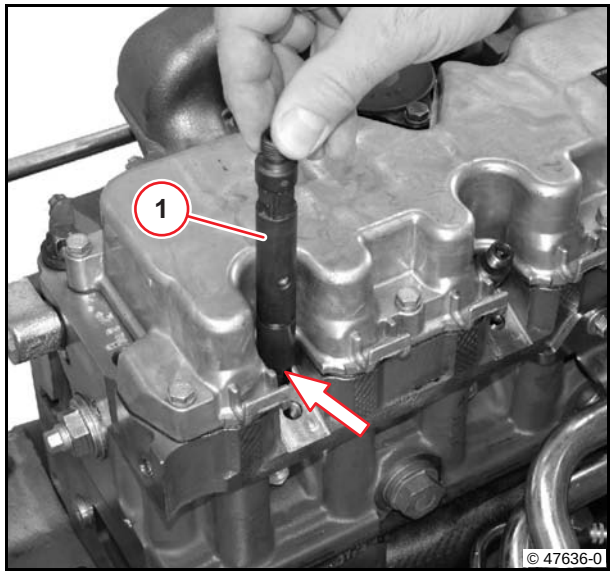
- Unscrew screw (1).
- Remove clamping shoe (2).



- Pull out fuel injector (1) and sealing ring (arrow).

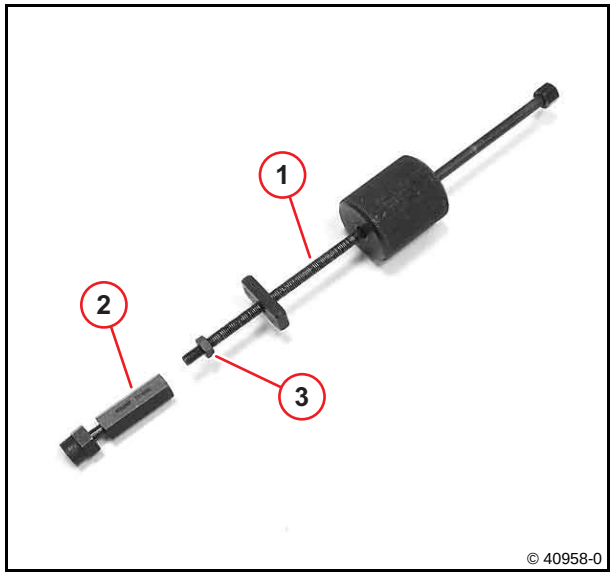
Lay out components in the order in which they should be installed.

Note cylinder assignment.

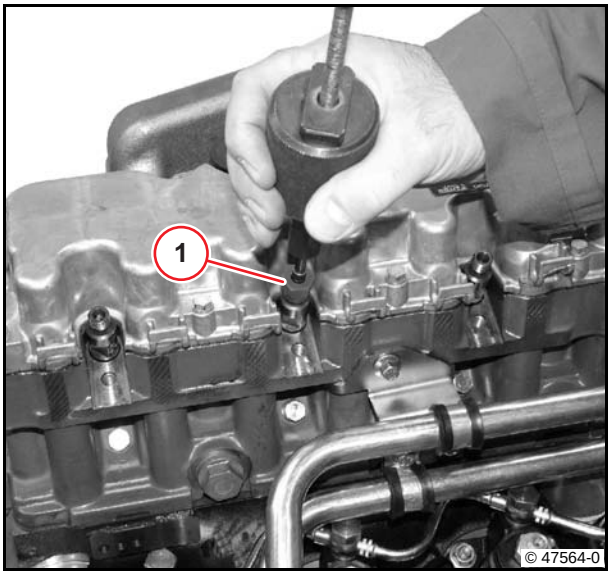


Removing stuck fuel injectors

- Assembly sliding hammer (1) and puller (2).
- Tighten lock nut (3).

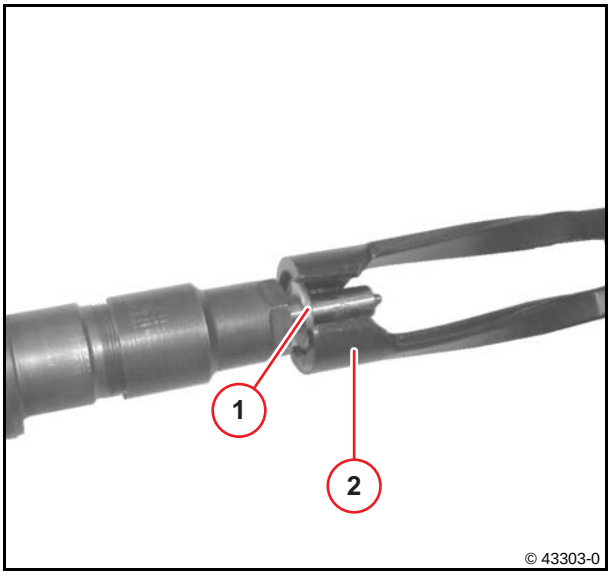


- Mount sliding hammer on fuel injector.
- Screw on lock nut (1).
- Pull out stuck fuel injector.



- Grip a tight sealing ring (1) with the assembly pliers (2) and pull off, turning slightly.

Attention!
Do not damage the nozzle tip!



- Visually inspect the components.
- Check the fuel injector.

W07-07-02

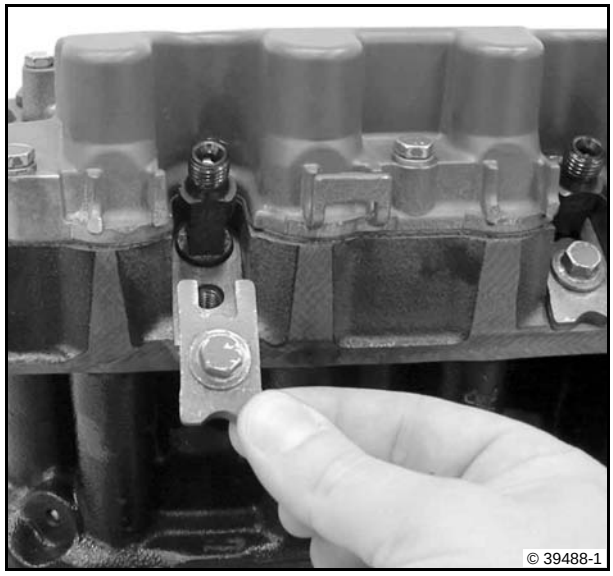
Installing the fuel injector

- Mount new sealing ring (1) on fuel injector.

- Insert fuel injector.
- Mount clamping shoe.

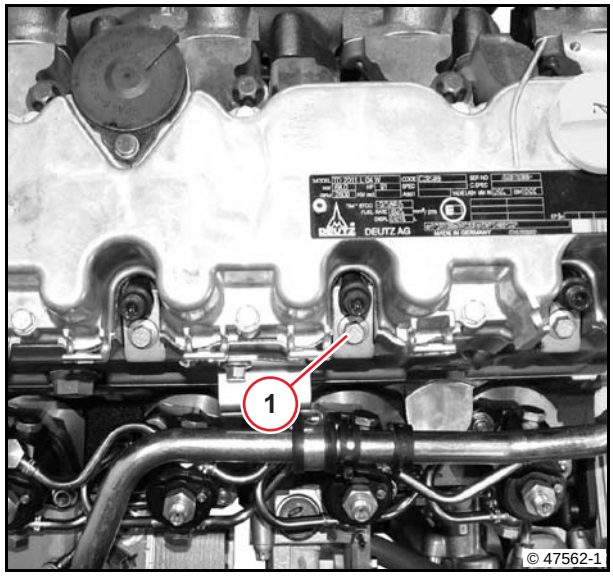
Note installation position of the clamping shoe.

- Fasten screws.



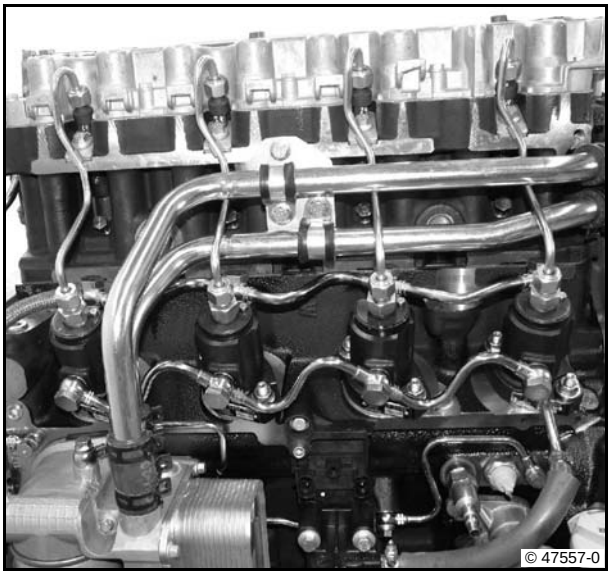
- Tighten screw (1).

21 Nm



- Install injection lines.

W 07-03-01



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A07 001	Fuel injector on cylinder head			21 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

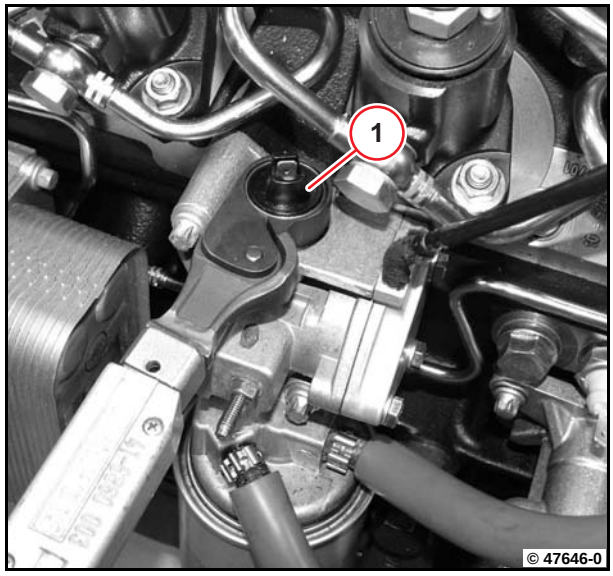
Removing and installing the lifting magnet (charge air pressure-dependent full load stop)

Commercial available tools:
– Plier insert. 8027

Special tools:
– Disassembly tool. 110901

Remove lifting magnet

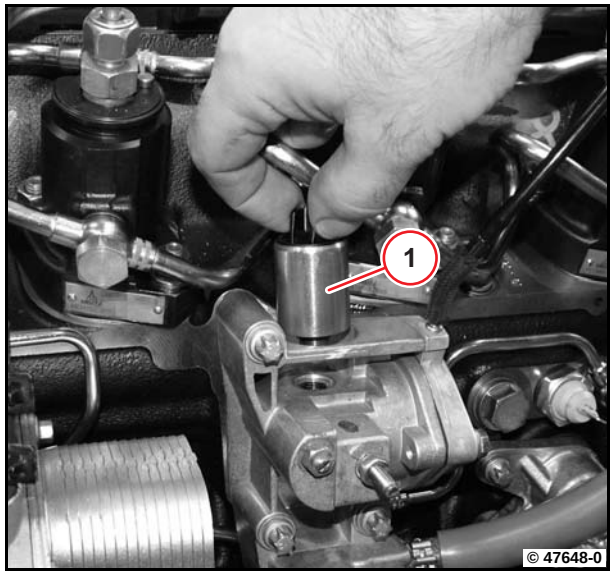
- Pull out cable plug.
- Unscrew lifting magnet (1) with plier insert.



- Remove the O-ring with the disassembly tool.
- Visually inspect the components.

Install lifting magnet

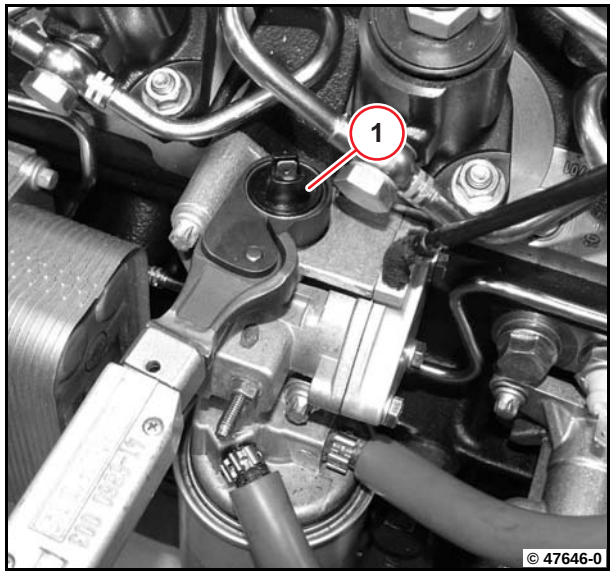
- Mount new O-ring.
- Insert lifting magnet (1).



6

- Tighten lifting magnet (1) with plier insert.

10 Nm



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A06 094	Lifting magnet on fuel filter console		Renew O-ring	10 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

Installing and removing charge air pressure-dependent full load stop

Commercial available tools:
– Plier insert. 8027

Special tools:
– Disassembly tool. 110901

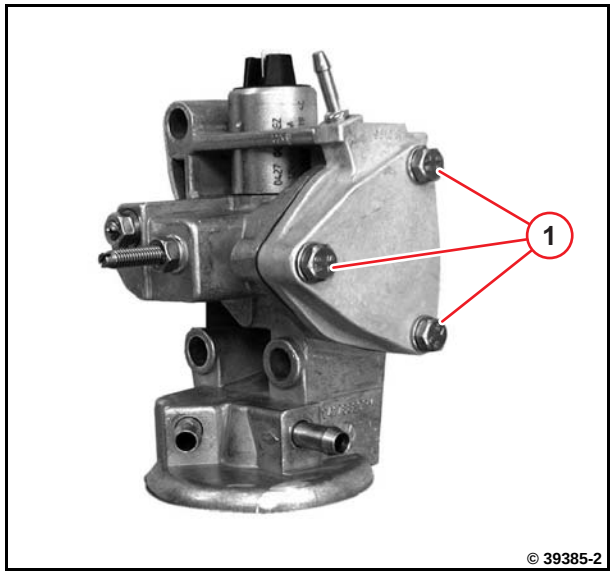
– W 07-10-08

Removing the charge air-pressure dependent full load stop

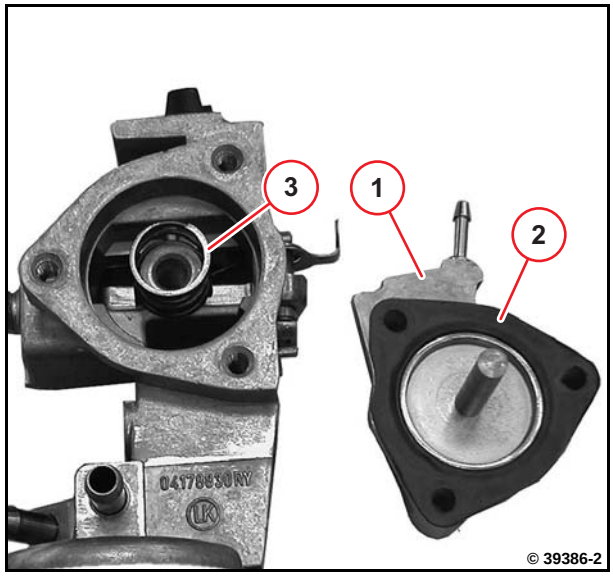
- Remove fuel filter console.

  W 07-10-08

- Unscrew screws (1).

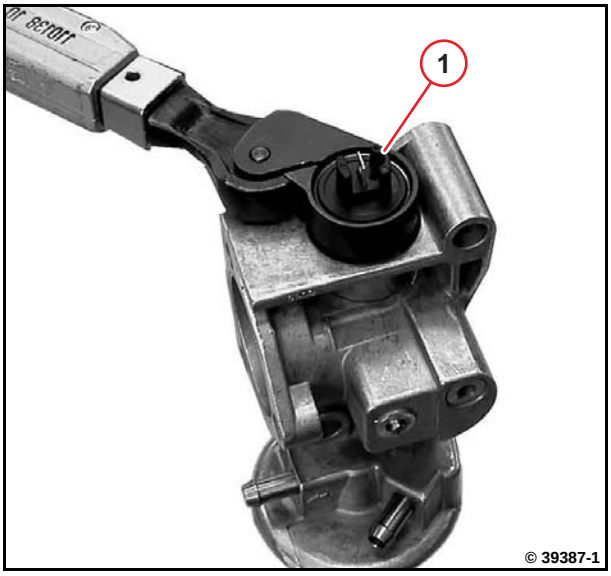


- Remove cover (1).
- Remove diaphragms (2).
- Remove spring (3).



6

- Unscrew lifting magnet (1) with plier insert.

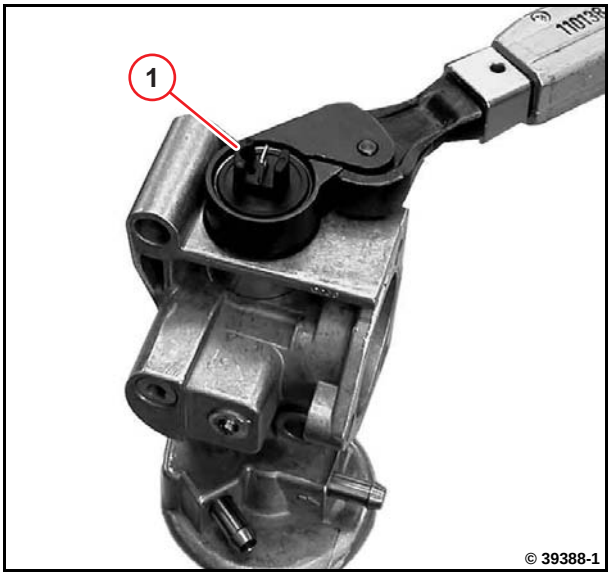


- Remove the O-ring with the disassembly tool.
- Visually inspect the components.

Installing the charge air-pressure dependent full load stop

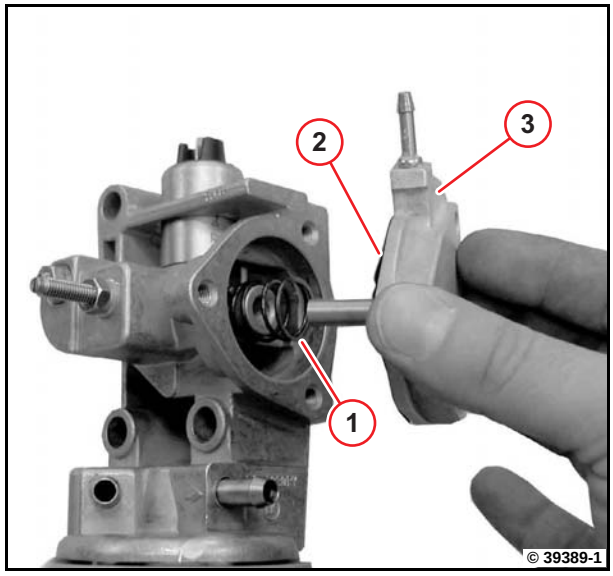
- Clean sealing surfaces.
- Mount new O-ring.
- Tighten lifting magnet (1) with plier insert.

10 Nm



- Insert spring (1).
- Insert diaphragm (2) and cap (3).

Attention!
Note installation position.

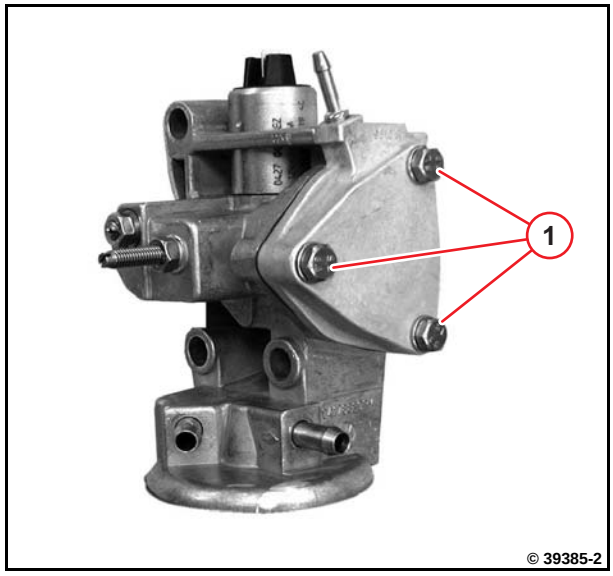


- Tighten screws (1).

8 Nm

- Install the fuel filter console.

W 07-10-08



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A06 094	Lifting magnet on fuel filter console		Renew O-ring	10 Nm
A07 096	Cap on charge air-dependent full load stop			8 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing fuel pipes

Commercial available tools:
– Hose clip pliers 8011
– Torx tool set 8189
– Spring band pliers 9090

Special tools:
– Plugs/caps 170160

– Fitting compound
DEUTZ AP1908

Danger!

Wait 30 seconds after switching off the engine before working on the fuel system.

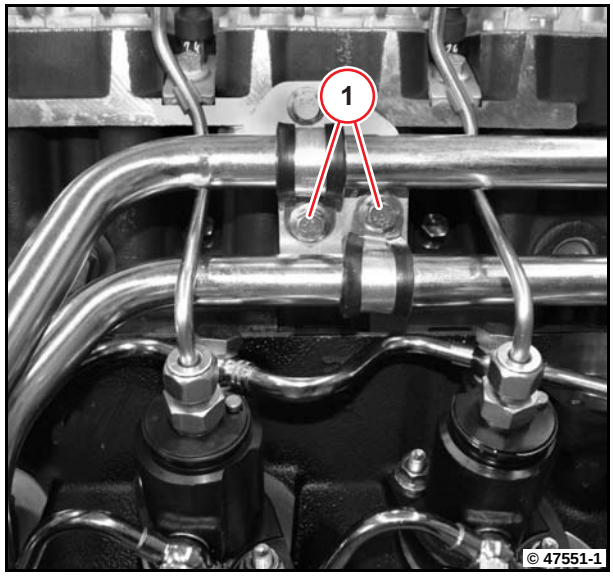
Attention!

Pay attention to utmost cleanliness when working on the fuel system.
Remove residue paint and particles of dirt before removing.
Clean the respective affected parts carefully. Blow damp areas dry with compressed air.
Observe the safety regulations and national specifications for handling fuels.
Close all connections immediately after opening with new, clean plugs/caps.
Do not remove plugs/caps until immediately before assembling.
Collect leaking operating substances in suitable vessels and dispose of according to regulations.
After all work on the fuel system, it must be bleeded - see the operation manual, chapter "6 Fuel system".

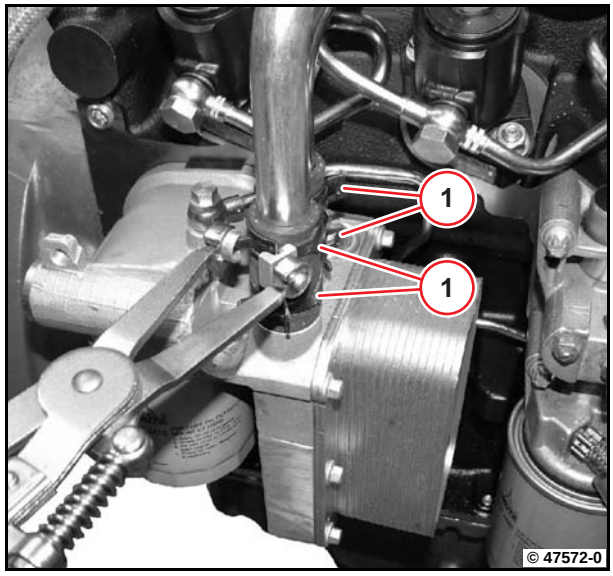
6

Removing fuel pipes

- Unscrew screws (1).

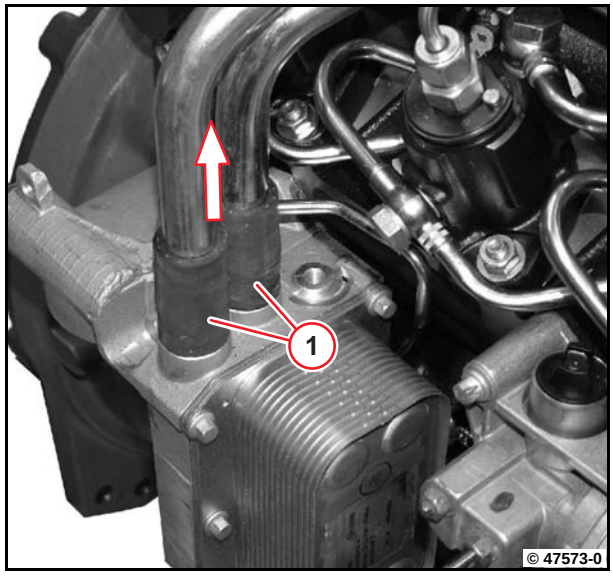


- Loosen spring band clips (1) with spring band pliers.



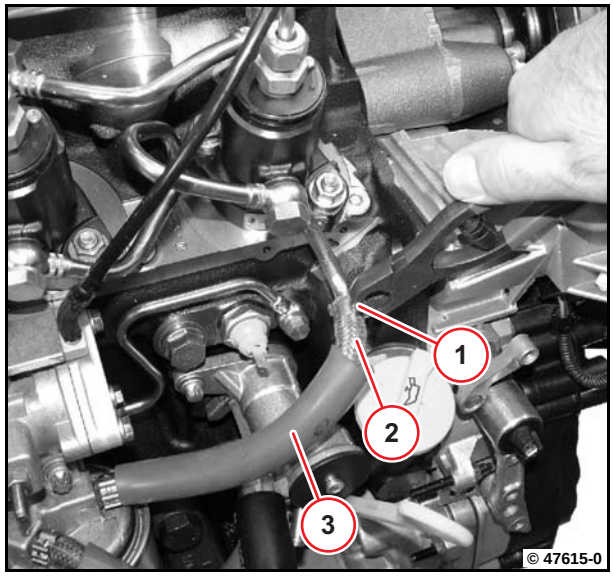
6

- Pull off hose pieces (1) in the direction of the arrow.



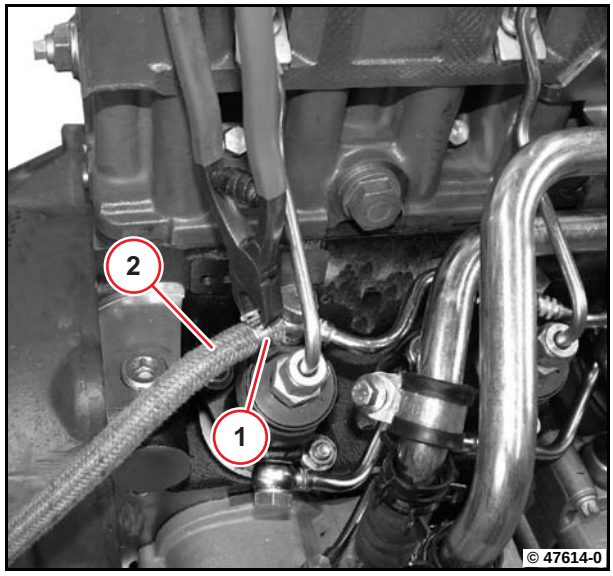
- Loosen hose clip (1).
- Pull off fuel pipe (2).
- Pull off protective hose (3).

Collect draining fuel and dispose of according to regulations.

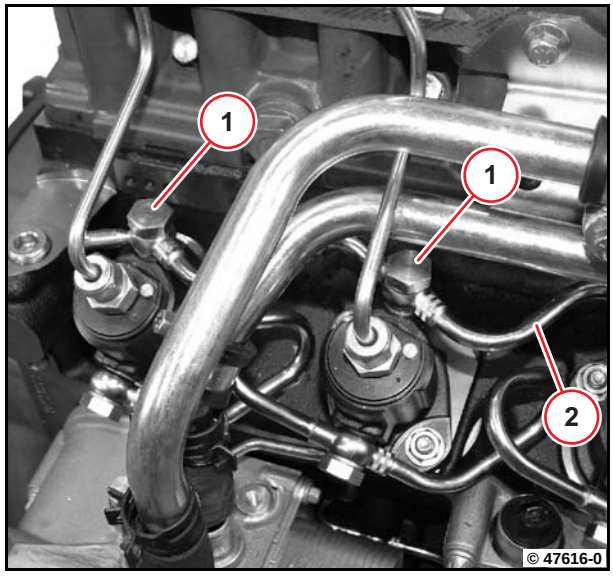


- Loosen hose clip (1).
- Pull off fuel pipe (2).

Collect draining fuel and dispose of according to regulations.



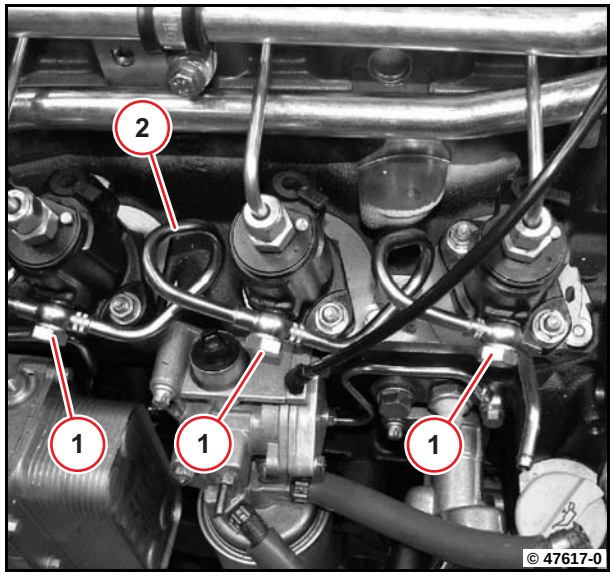
- Unscrew hollow screws (1).
- Remove fuel pipe (2).
- Remove sealing rings.



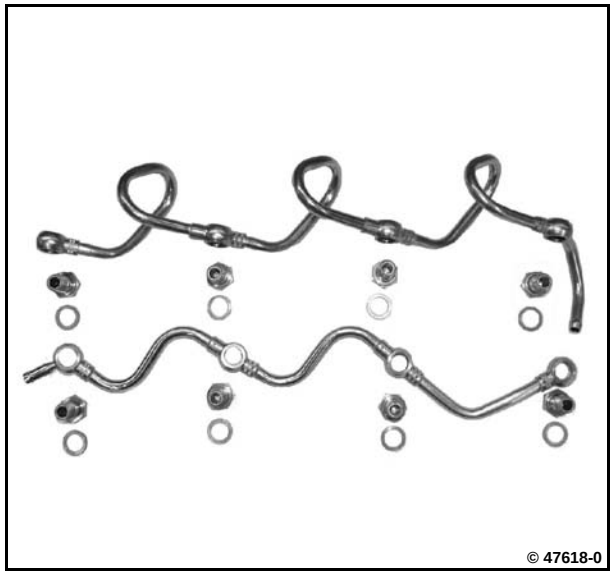
- Unscrew hollow screws (1).
- Remove fuel return line (2).

Remove fuel return line in the direction of the flywheel.

- Remove sealing rings.



- Visually inspect the components.

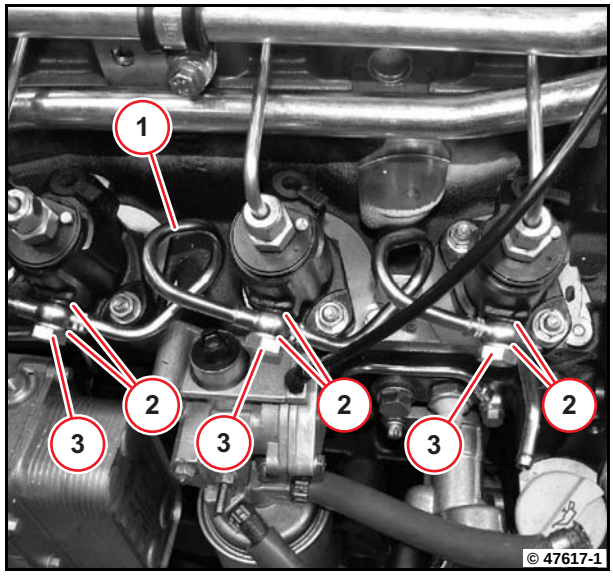


6

Installing fuel pipes

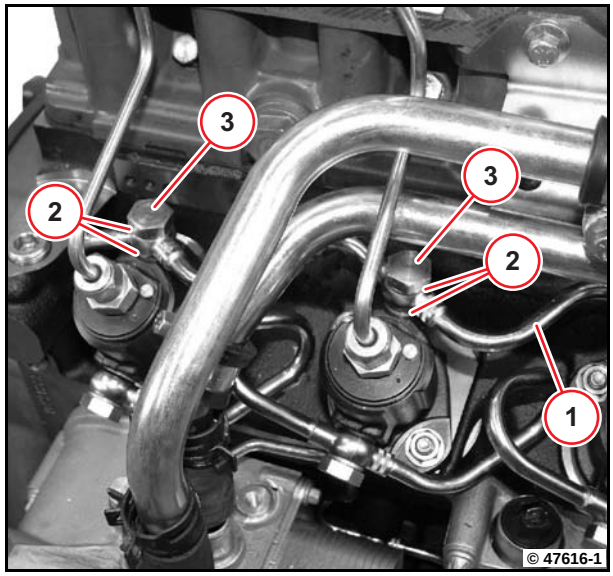
- Mount fuel return pipe (1).
- Mount sealing rings (2).
- Tighten hollow screw (3).

29 Nm



- Mount fuel pipe (1).
- Mount sealing rings (2).
- Tighten hollow screw (3).

29 Nm



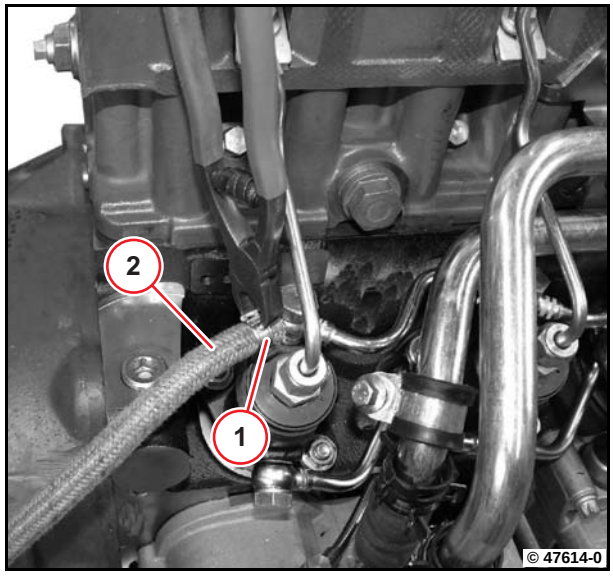
- Mount fuel hose (2).

Lay hose without contact.

Ensure that the installation location is free from faults.

- Mount new hose clip (1).
- Fix the hose clip (1) with the hose clip pliers.

Ensure that the installation location is free from faults.

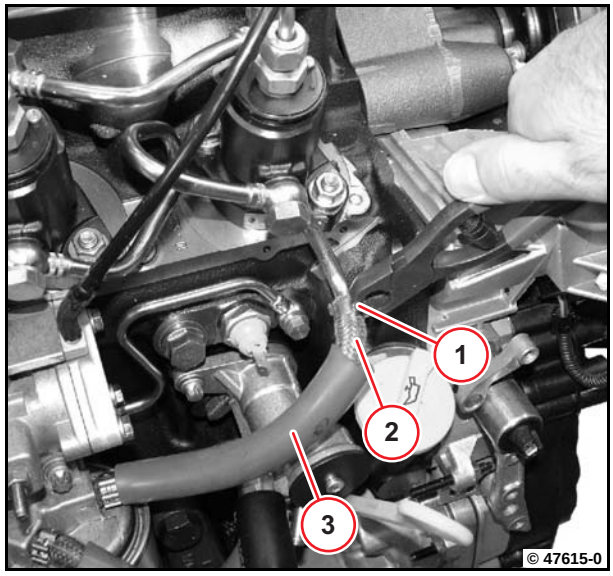


- Slip protective hose (3) over with mounting compound.

Lay hose without contact.

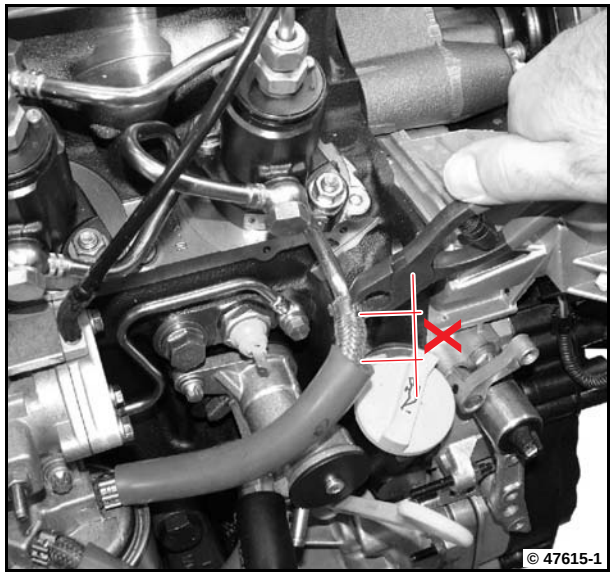
Ensure that the installation location is free from faults.

- Mount fuel hose (2).
- Mount new hose clip (1).

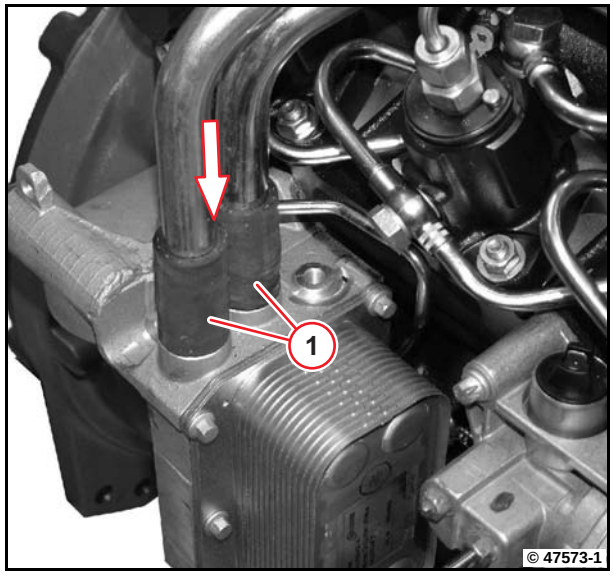


- Position protective hose, dimension X.

20 mm

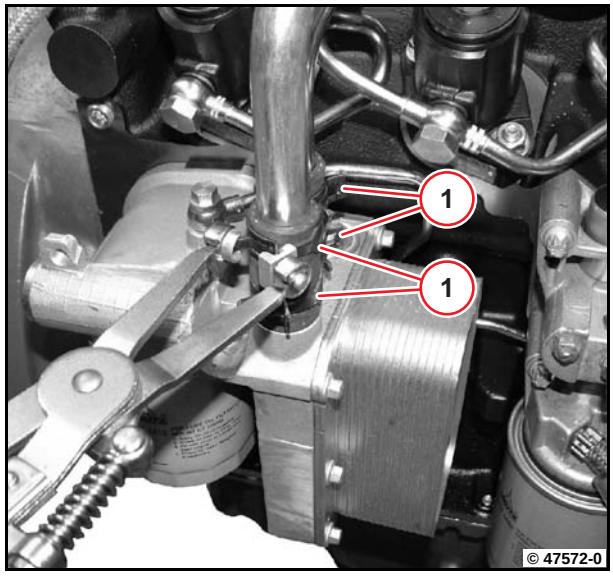


- Push on hose pieces (1) in the direction of the arrow.



6

- Position spring band clips (1) with spring band pliers.

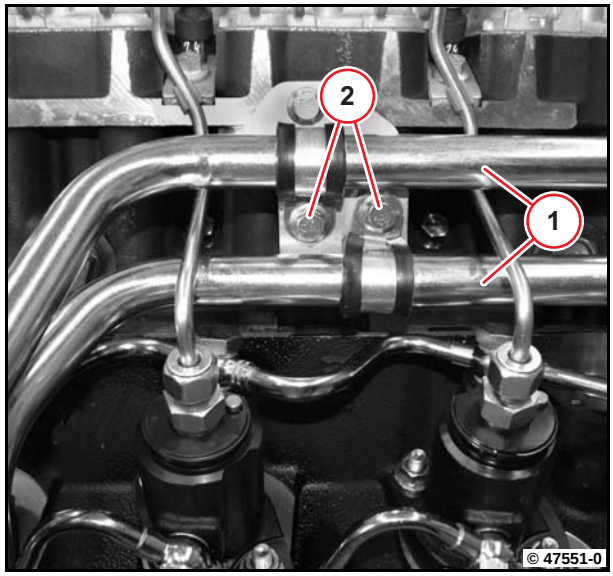


- Position clamping claws (1).

Attention!
Install tension-free.

- Tighten screws (2).

21 Nm



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A07 015	Fuel supply line to injection pump	Hollow screw	Replace sealing rings	29 Nm
A07 061	Fuel return line on injection pump	Hollow screw	Replace sealing rings	29 Nm
A09 020	Pipe clip on holder	M6x16		21 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

Removing and installing the fuel filter console

Commercial available tools:
– Hose clip pliers 8011
– Torx tool set 8189

Special tools:
– Disassembly tool. 110901
– Special wrench 170050
– Plugs/caps 170160

– Fitting compound
DEUTZ AP1908

Danger!

Wait 30 seconds after switching off the engine before working on the fuel system.

Attention!

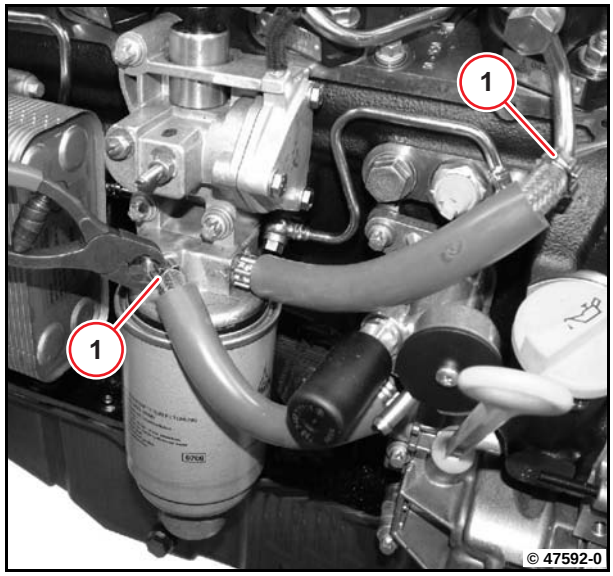
Pay attention to utmost cleanliness when working on the fuel system.
Remove residue paint and particles of dirt before removing.
Clean the respective affected parts carefully. Blow damp areas dry with compressed air.
Observe the safety regulations and national specifications for handling fuels.
Close all connections immediately after opening with new, clean plugs/caps.
Do not remove plugs/caps until immediately before assembling.
Collect leaking operating substances in suitable vessels and dispose of according to regulations.
After all work on the fuel system, it must be bleeded - see the operation manual, chapter "6 Fuel system".

Removing the fuel filter console

- Loosen hose clips (1) with hose clip pliers.

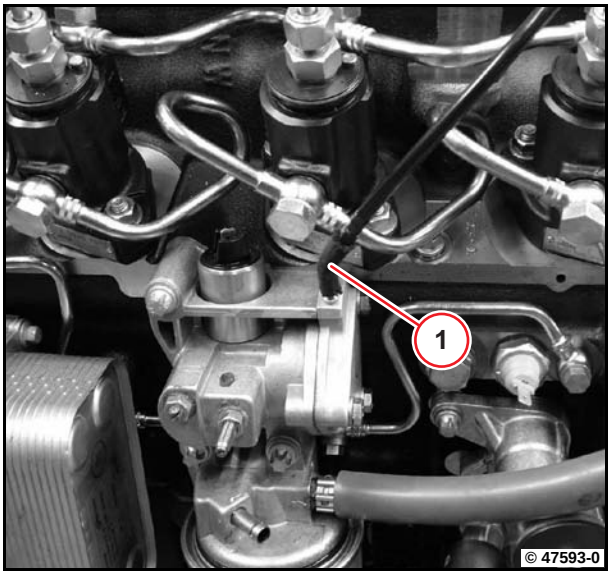
Collect draining fuel and dispose of according to regulations.

- Pull off fuel hoses.

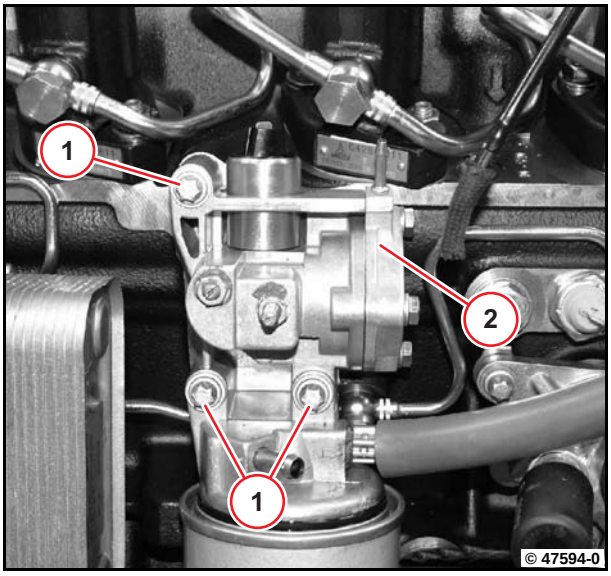


6

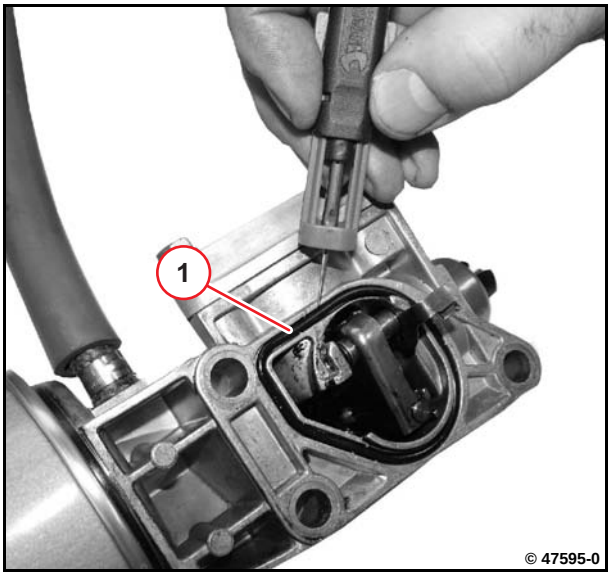
- Pull off hose pipe (1).



- Unscrew screws (1).
- Remove fuel filter console (2).



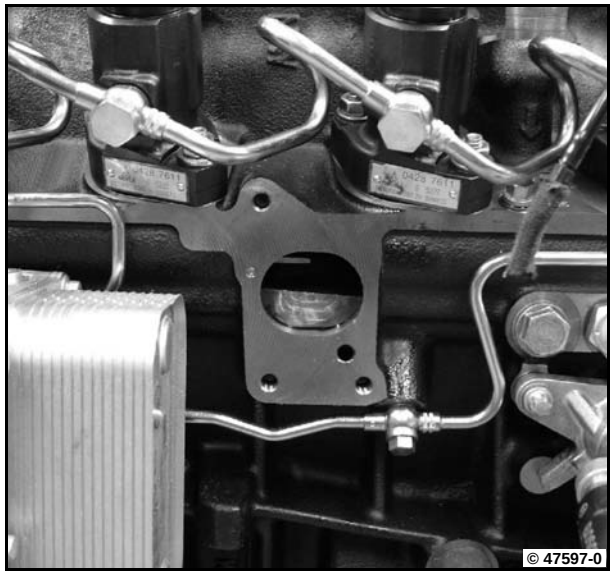
- Remove the O-ring (1) with the disassembly tool.



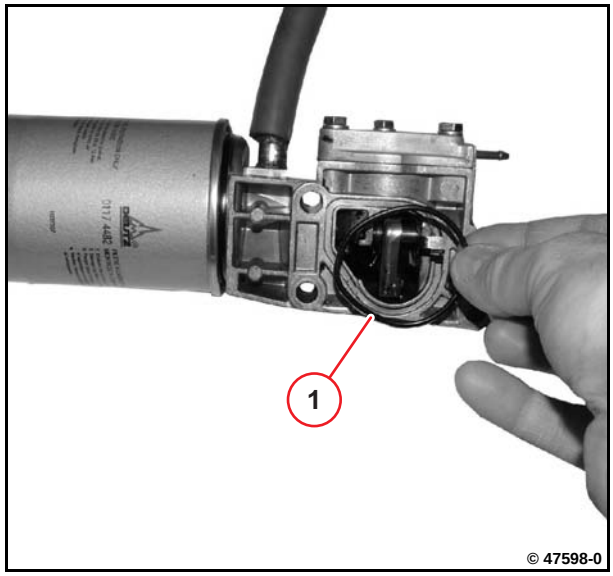
- Visually inspect the components.

Installing the fuel filter console

- Clean sealing surfaces.

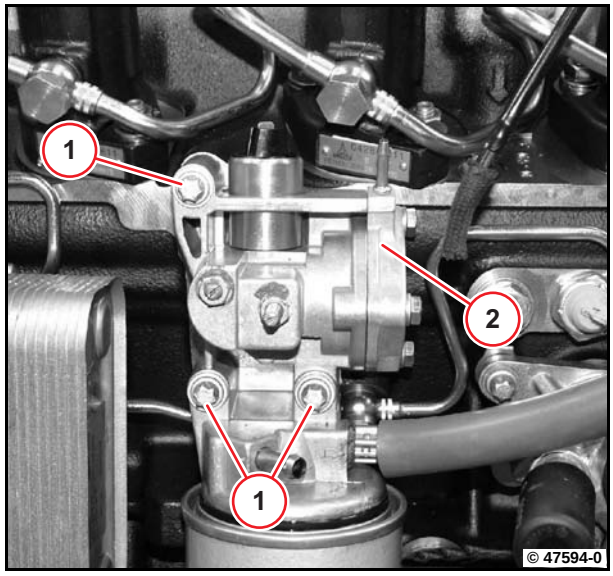


- Insert new sealing ring (1).

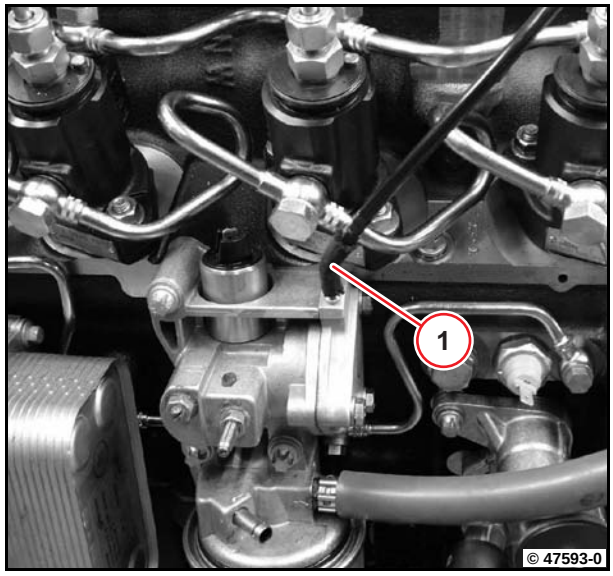


- Install the fuel filter console (2).
- Tighten screws (1).

22 Nm



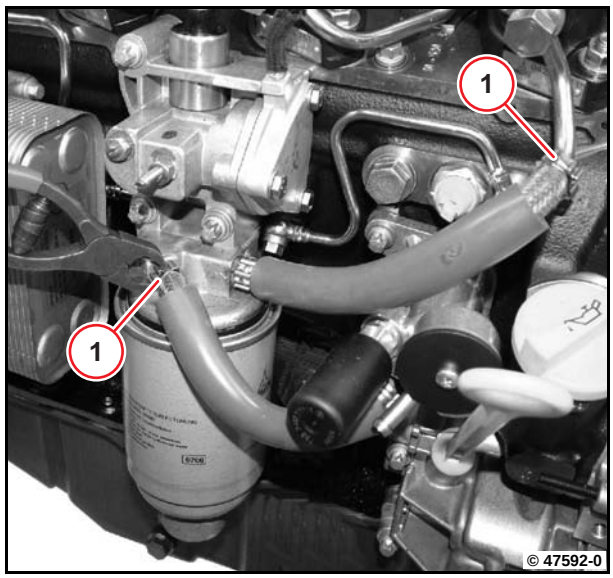
- Mount the hose pipe (1).



Note assignment!
Lay hoses without contact.

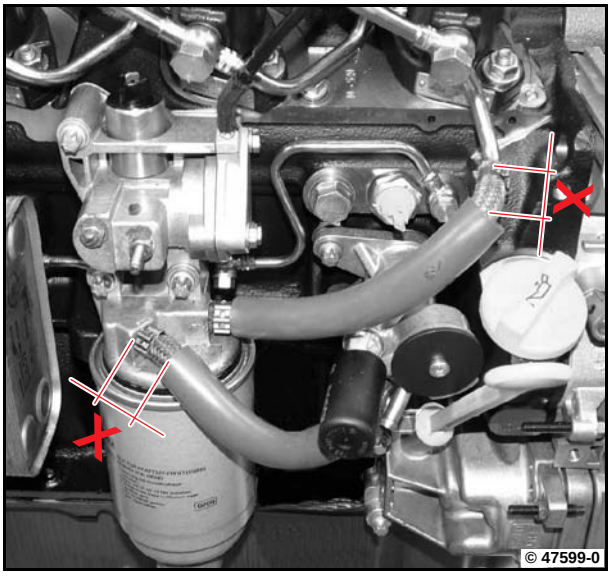
- Install fuel hoses.
- Mount new hose clips (1).
- Fasten hose clips (1) with hose clip pliers.

Ensure that the installation location is free from faults.



- Position protective hoses, dimension X.

  20 mm



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A07 087	Fuel filter console/full load stop to crankcase	Torx, M8x50-8.8		22 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing the fuel supply pump

Commercial available tools:
– Hose clip pliers 8011

Special tools:
– Disassembly tool. 110901
– Plugs/caps 170160

– Fitting compound
DEUTZ AP1908
– Lubricating oil

Danger!

Wait 30 seconds after switching off the engine before working on the fuel system.

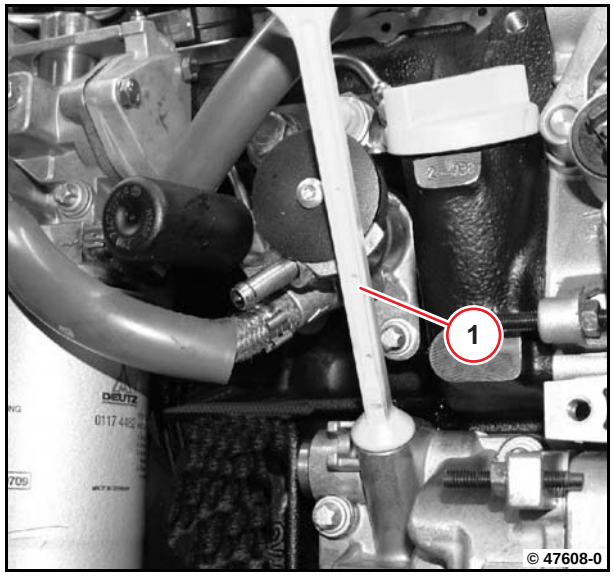
Attention!

Pay attention to utmost cleanliness when working on the fuel system.
Remove residue paint and particles of dirt before removing.
Clean the respective affected parts carefully. Blow damp areas dry with compressed air.
Observe the safety regulations and national specifications for handling fuels.
Close all connections immediately after opening with new, clean plugs/caps.
Do not remove plugs/caps until immediately before assembling.
Collect leaking operating substances in suitable vessels and dispose of according to regulations.
After all work on the fuel system, it must be bleeded - see the operation manual, chapter "6 Fuel system“.

6

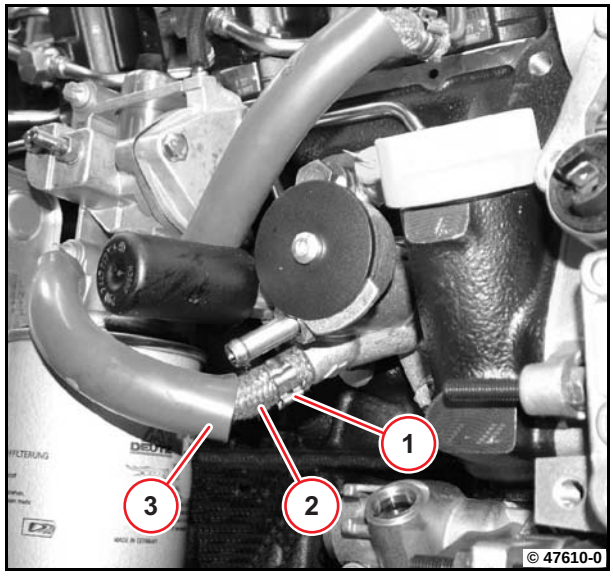
Removing the fuel supply pump

● Pull out oil dipstick (1).

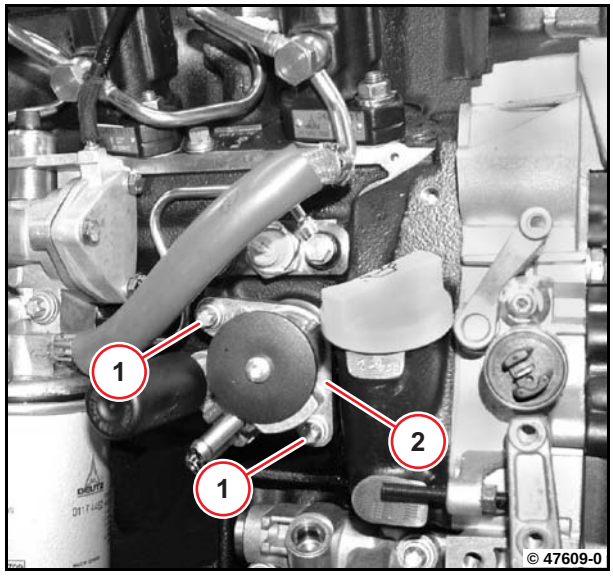


- Loosen hose clip (1).
- Pull off fuel pipe (2).
- Pull off protective hose (3).

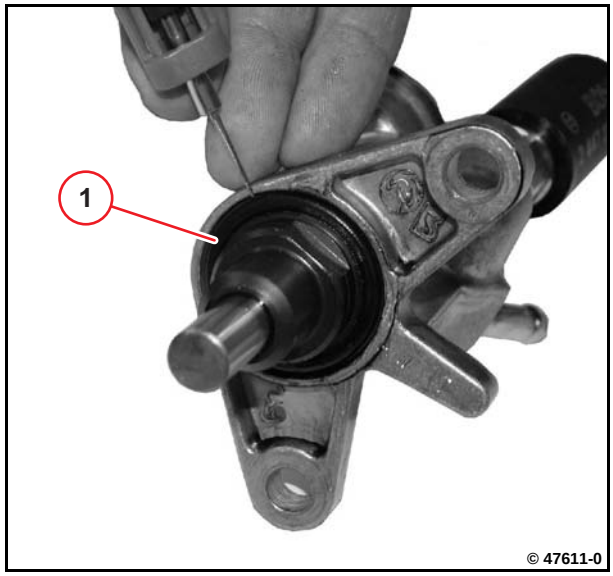
Collect draining fuel and dispose of according to regulations.



- Unscrew screws (1).
- Remove fuel supply pump (2).

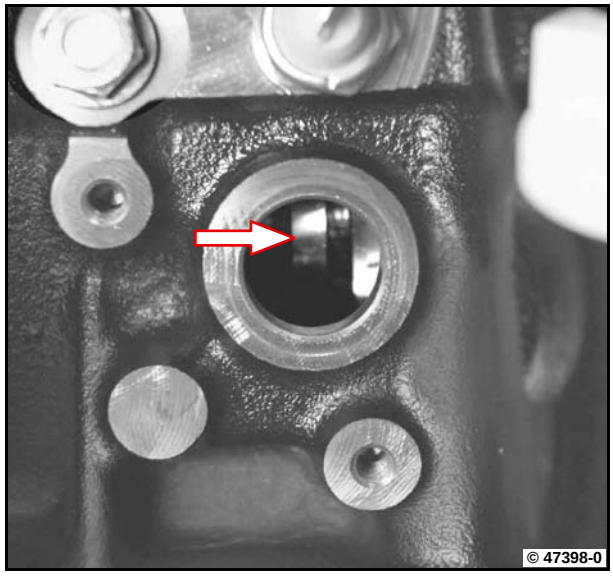


- Remove the O-ring (1) with the disassembly tool.
- Visually inspect the components.

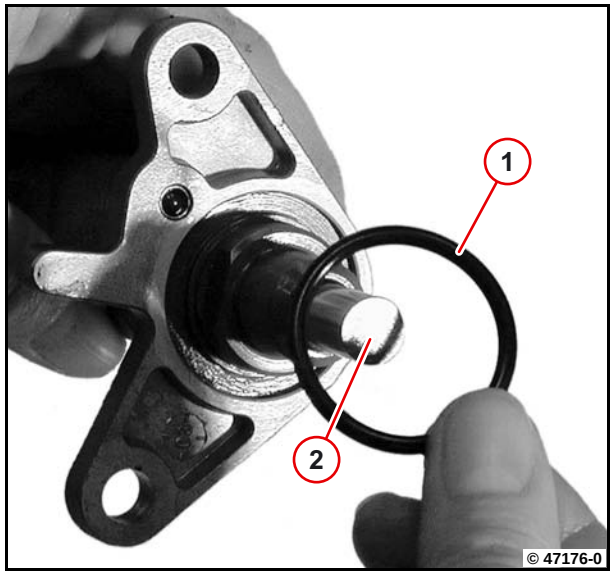


Installing the fuel supply pump

- Turn the crankshaft until the eccentric of the camshafts is in the top dead centre (arrow).

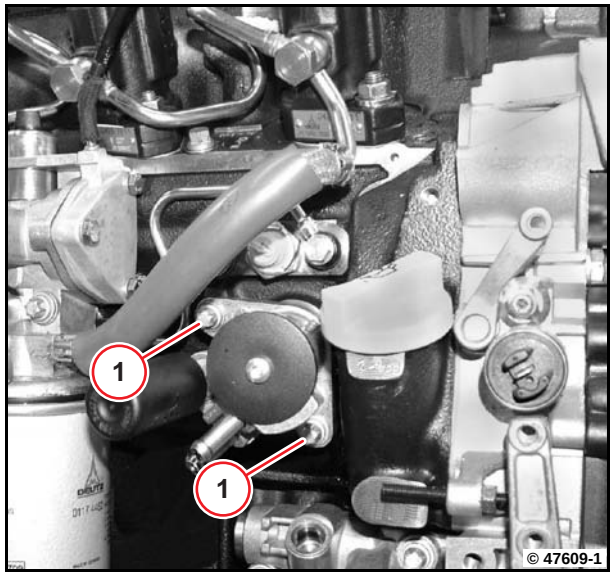


- Insert new O-ring (1).
- Oil tappet (2) lightly with lubricating oil.



- Clean all sealing surfaces.
- Mount fuel supply pump.
- Press fuel supply pump centrally on the crankcase.
- Tighten screws (1).

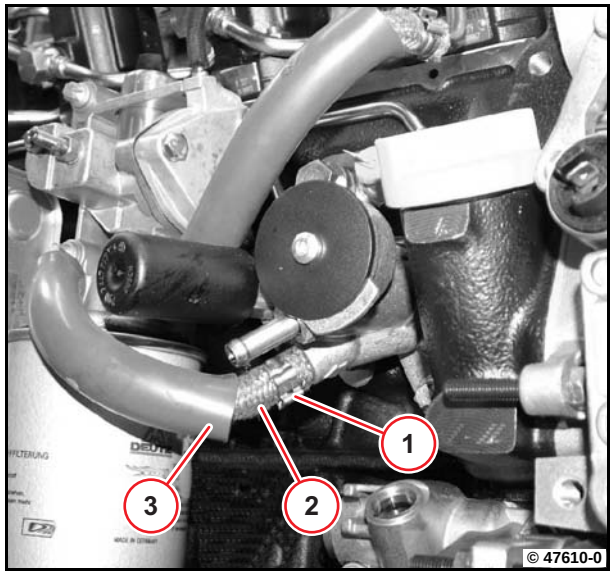
21 Nm



- Slip protective hose (3) over with mounting compound.

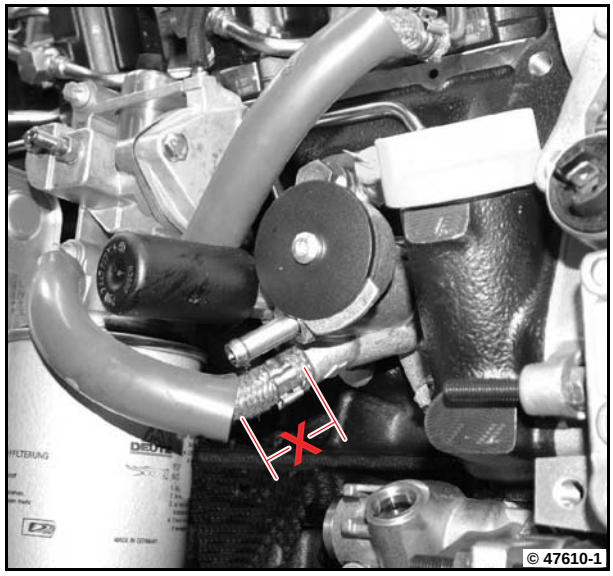
Lay hose without contact.

- Mount fuel hose (2).
- Mount new hose clip (1).



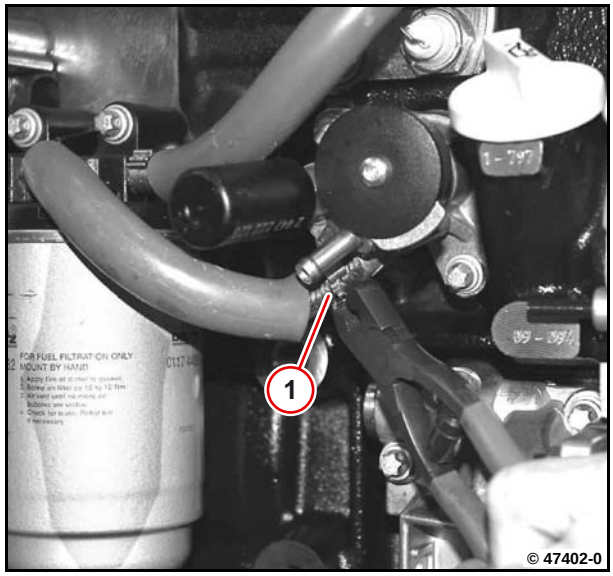
- Position protective hose, dimension X.

20 mm

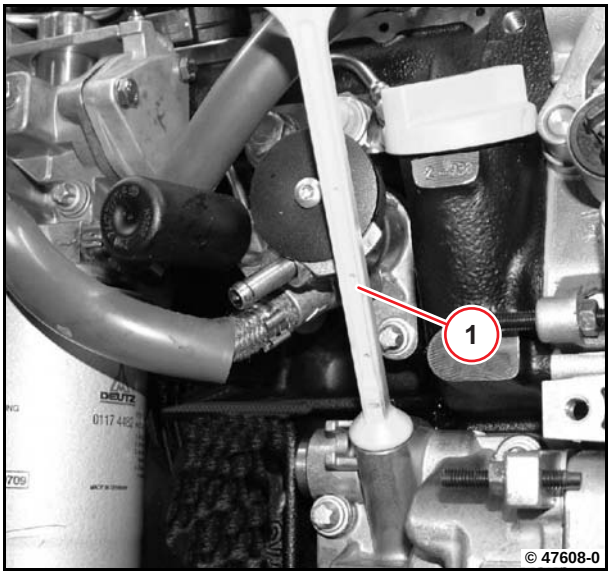


- Fix the hose clip (1) with the hose clip pliers.

Ensure that the installation location is free from faults.



- Insert oil dipstick (1).



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A07 024	Fuel supply pump on crankcase			21 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing the lubricating oil cooler

Commercial available tools

– W 08-11-07

Collect leaking operating substances in suitable vessels and dispose of according to regulations.

Emptying and filling the engine with operating media must be carried out according to the operating manual and the appropriate documentation of the vehicle/equipment manufacturer.

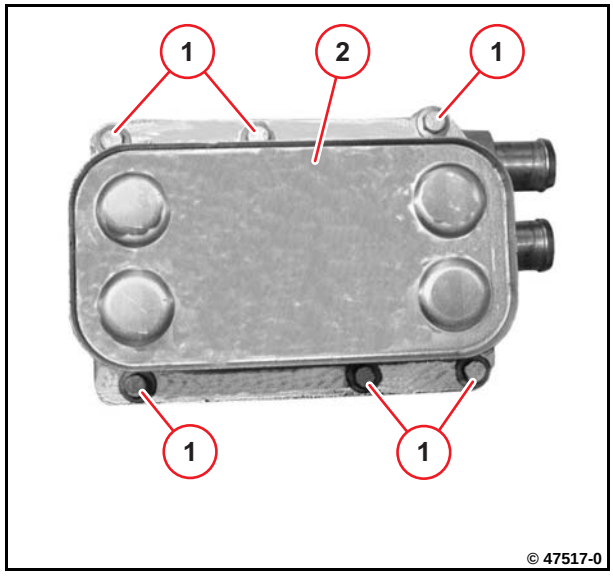
6

Removing the lubricating oil cooler

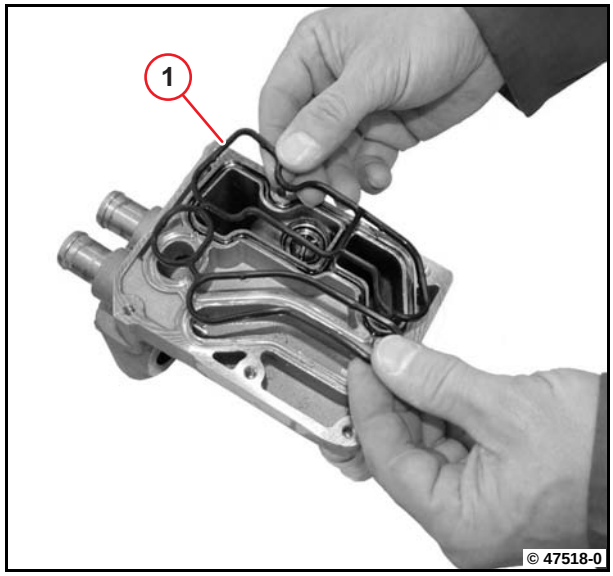
- Remove oil filter console.

  W 08-11-07

- Unscrew screws (1).
- Remove lubricating oil cooler (2).

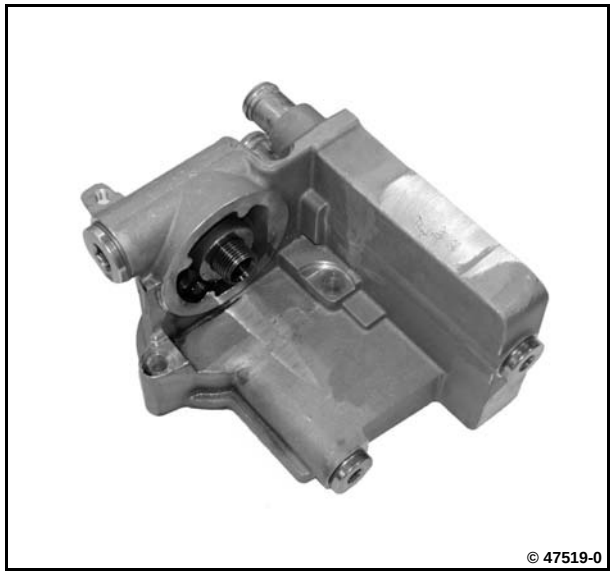


- Remove sealing ring (1).

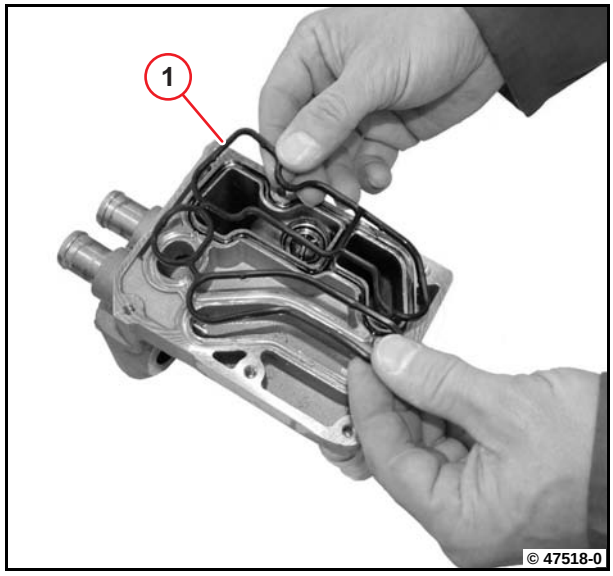


Installing the lubricating oil cooler

- Visually inspect the components.



- Clean sealing surfaces.
- Insert new sealing ring (1).



- Mount lubricating oil cooler (1).

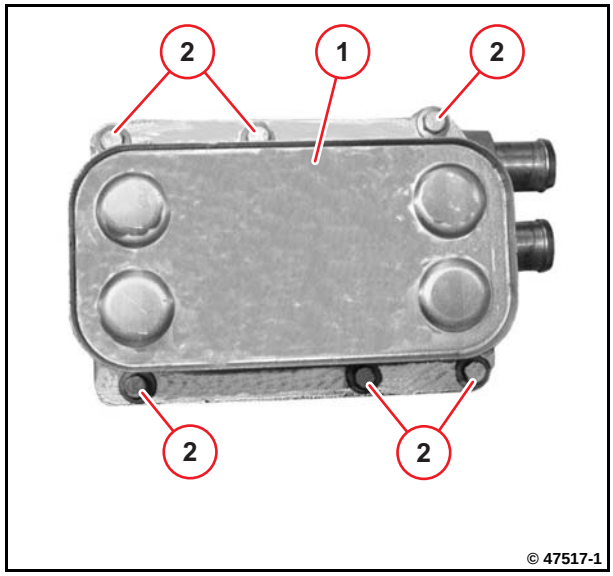
Ensure that the installation location of the sealing ring is free from faults.

- Tighten screws (2).
- Tighten screws (2).

13 Nm

- Mount oil filter console.

W 08-11-07



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A08 051	Lubricating oil cooler on oil filter console	M6x16-10.9		13 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

Removing and installing the oil filter console

Commercial available tools:
– Torx tool set 8189

Special tools:
– Disassembly tool. 110901
– Special wrench 170050

– Fitting compound
DEUTZ AP1908

– Operation manual
– W 08-08-02

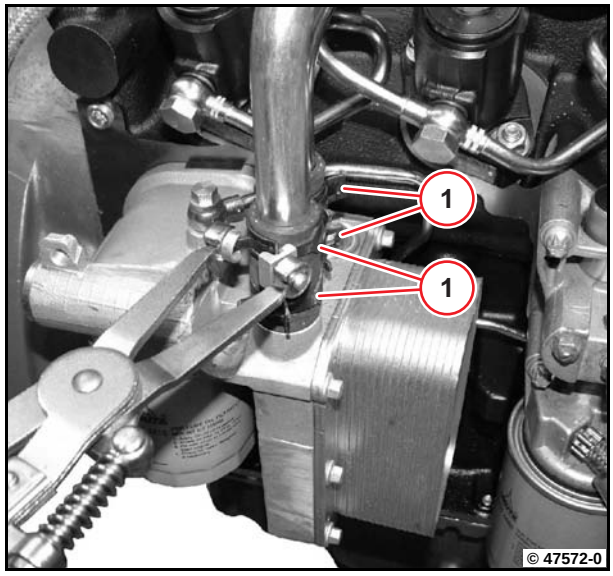
Collect leaking operating substances in suitable vessels and dispose of according to regulations.

Emptying and filling the engine with operating media must be carried out according to the operating manual and the appropriate documentation of the vehicle/equipment manufacturer.

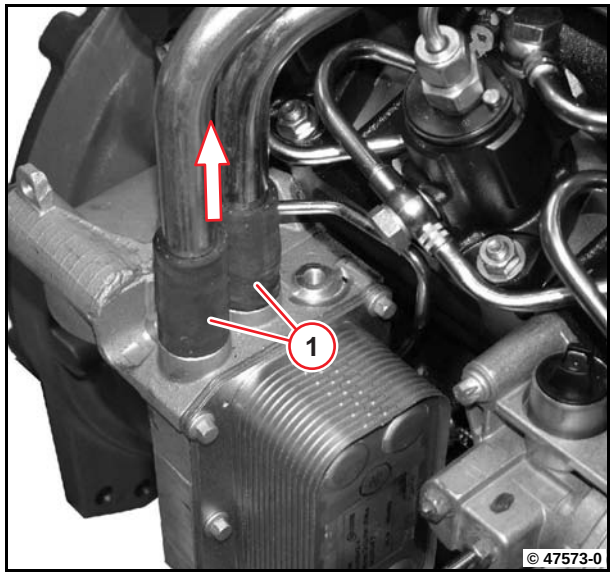
6

Removing the oil filter console

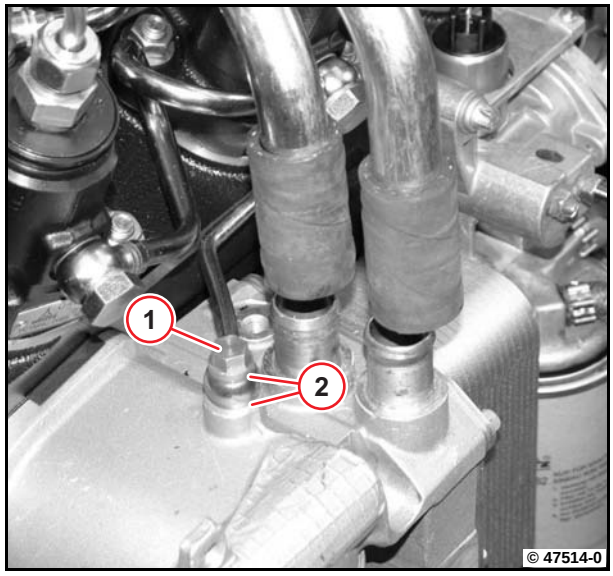
● Loosen spring band clip (1) with spring band pliers.



● Pull off hose pieces (1) in the direction of the arrow.



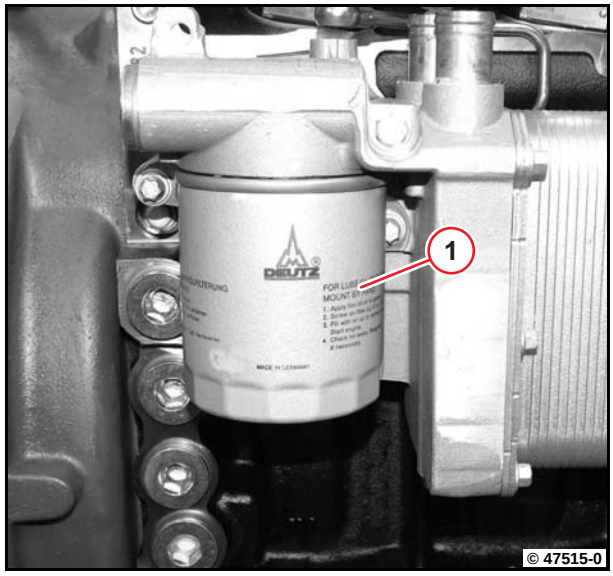
- Unscrew hollow screw (1).
- Remove sealing rings (2).



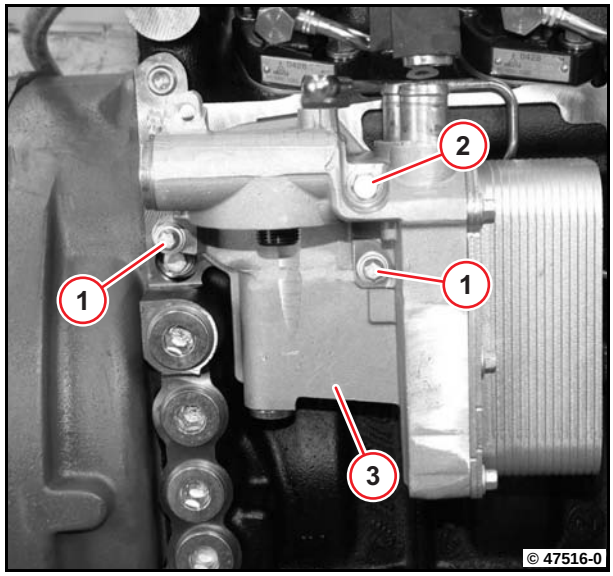
6

- Unscrew lubricating oil filter (1) with special wrench.

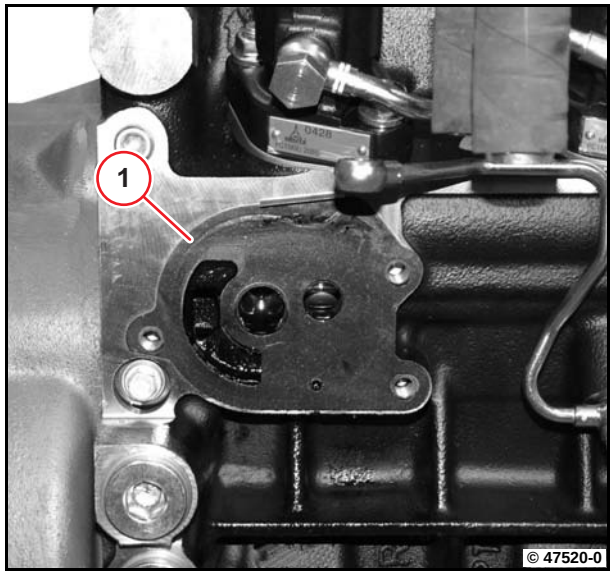
Collect draining lubricating oil and dispose of properly.



- Unscrew screws (1).
- Unscrew screw (2).
- Remove oil filter console (3).

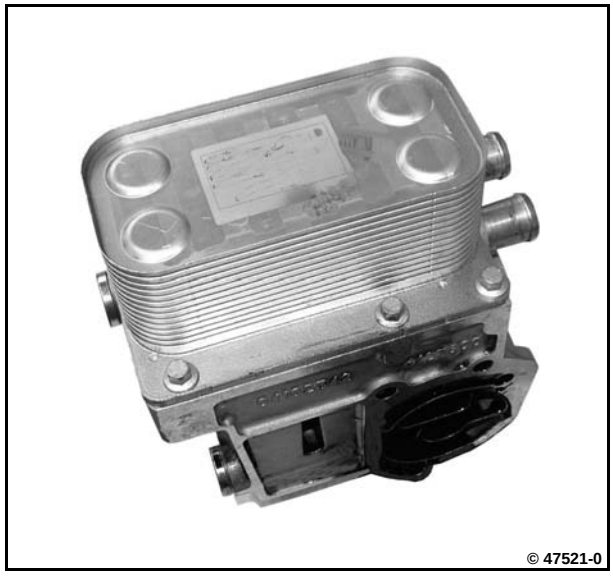


- Remove gasket (1).
- Clean sealing surfaces.

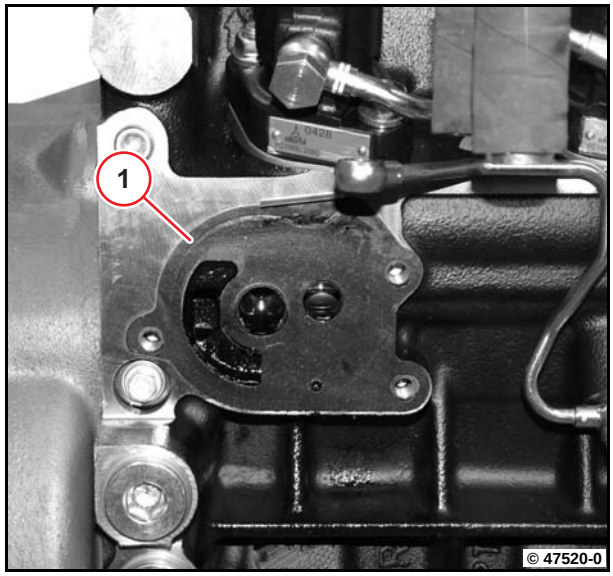


Installing oil filter console

- Visually inspect the components.



- Fix new gasket (1) to the crankcase with a little grease.



- Mount oil filter console (1).

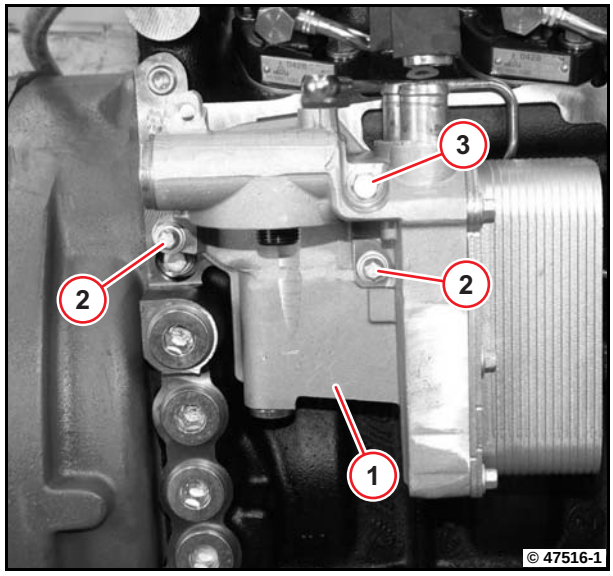
Do not move gasket.

- Tighten screws (2).
- Turn in screw (3).
- Tighten screws (2).

21 Nm

- Tighten screw (3).

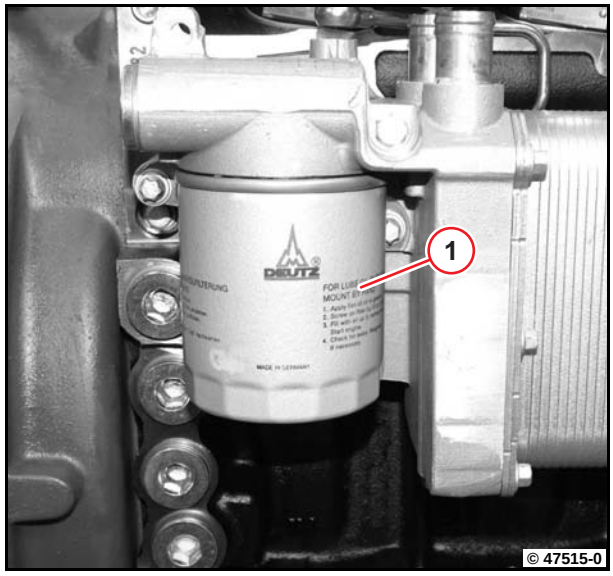
21 Nm



6

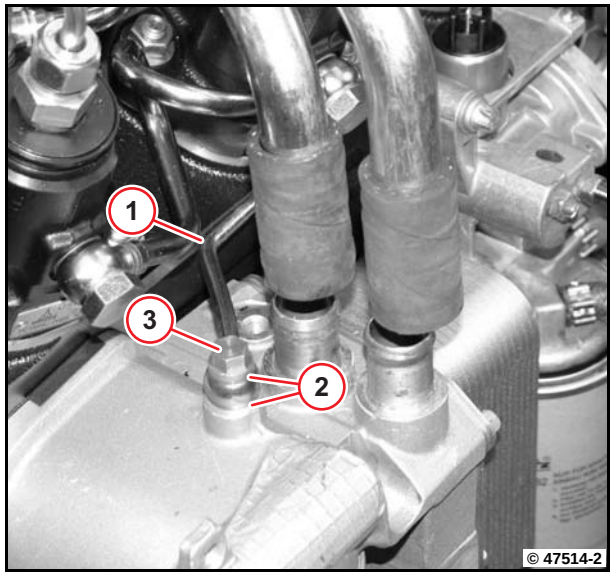
- Clean sealing surfaces.
- Lightly oil sealing ring on new lubricating oil filter.
- Tighten the lubricating oil filter (1) according to the operating instructions.

Operation manual

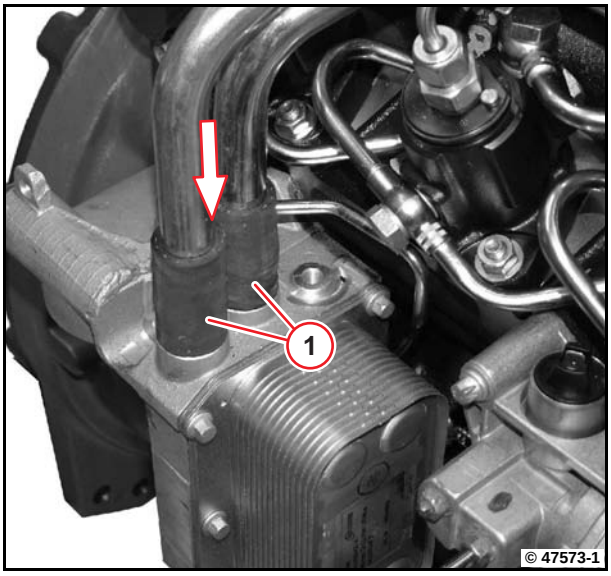


- Insert control line (1).
- Mount sealing rings (2).
- Tighten hollow screw (3).

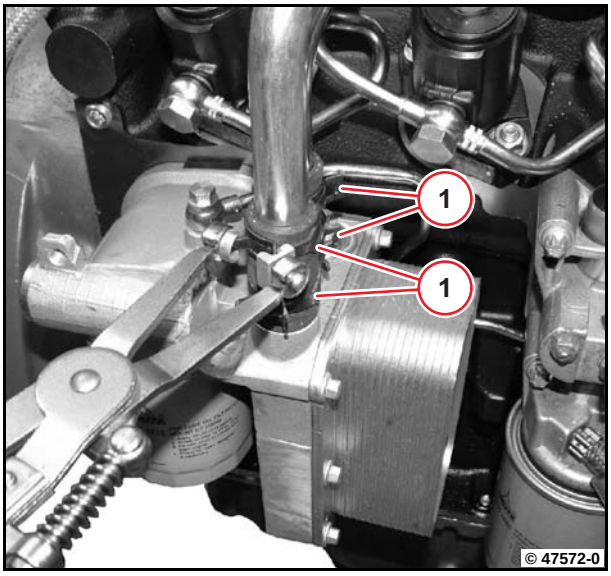
18 Nm



- Push on hose pieces (1) in the direction of the arrow.



- Position the spring band clip (1) with the spring band pliers.



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A08 003	Oil filter console on crankcase	Torx M8x50-8.8 Torx M8x90-8.8		21 Nm
A08 048	Control line to oil filter console / crankcase	Hollow screw M10x1		18 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

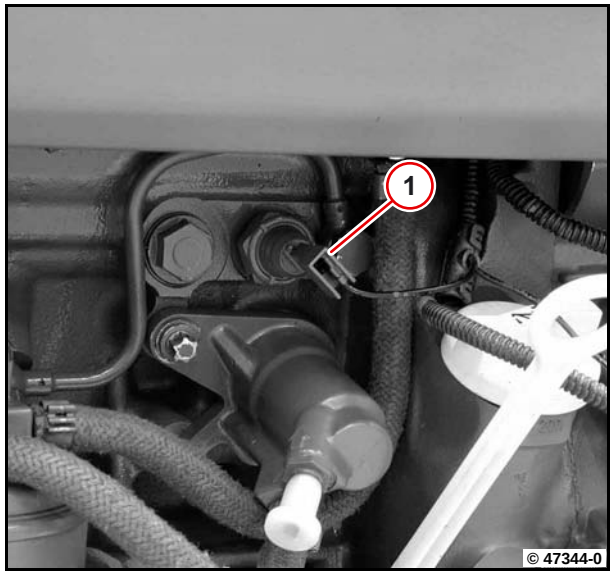
Removing and installing the oil pressure switch

Commercial available tools

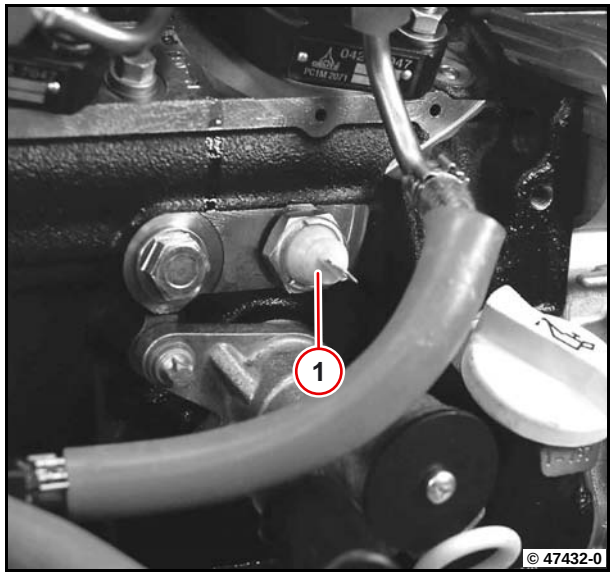
Collect leaking operating substances in suitable vessels and dispose of according to regulations.

Removing the oil pressure switch

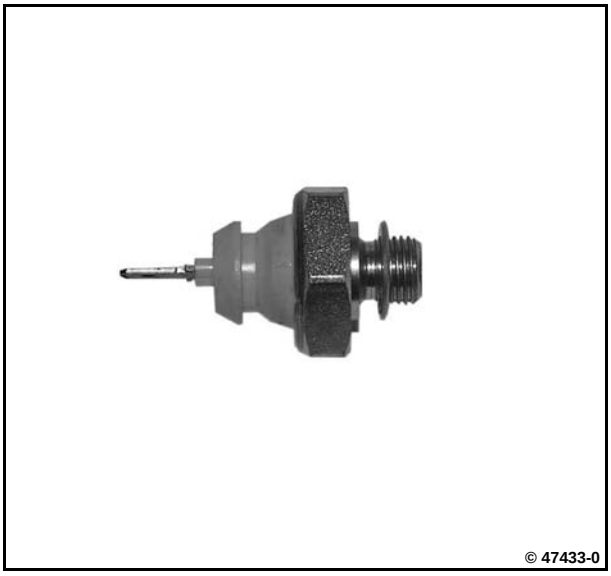
- Pull out cable plug (1).



- Unscrew oil pressure switch (1).



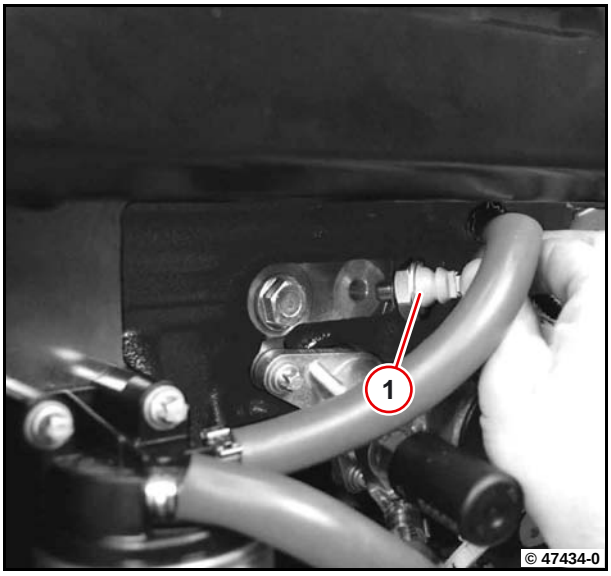
- Visually inspect the components.



6

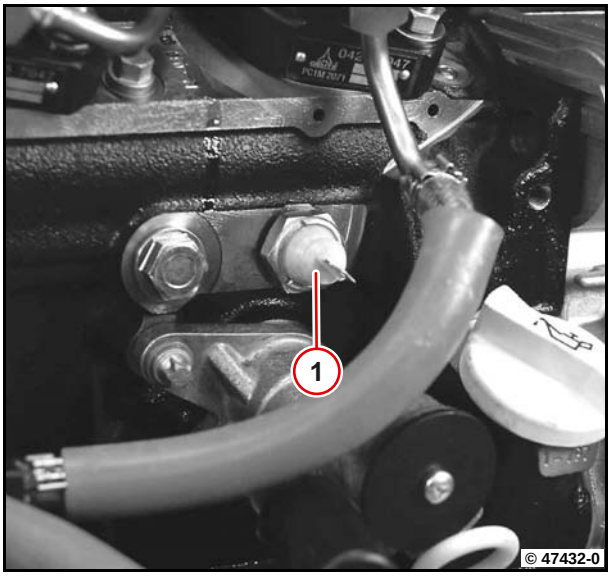
Installing the oil pressure switch

- Screw on oil pressure switch (1).



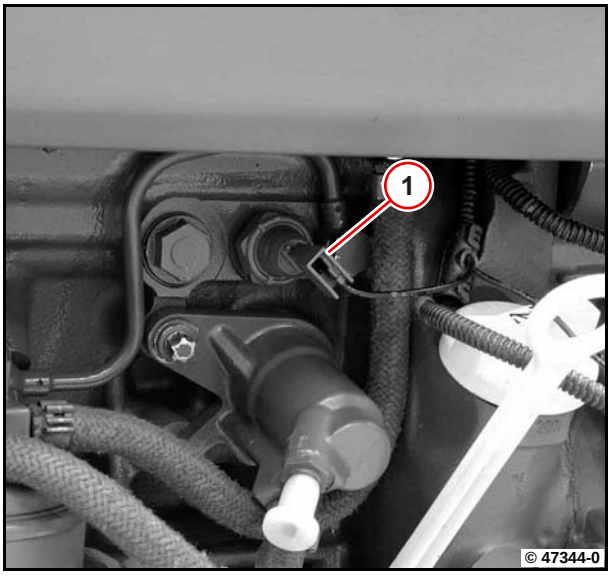
- Tighten oil pressure switch (1).

  13 Nm



- Plug in the cable plug (1).

Ensure that the connection is perfect.



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A08 091	Oil pressure switch on crankcase	M10x1		13 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing the thermostat (Lubricating oil cooler)

Commercial available tools:
– Slide gauge
– Torx tool set 8189

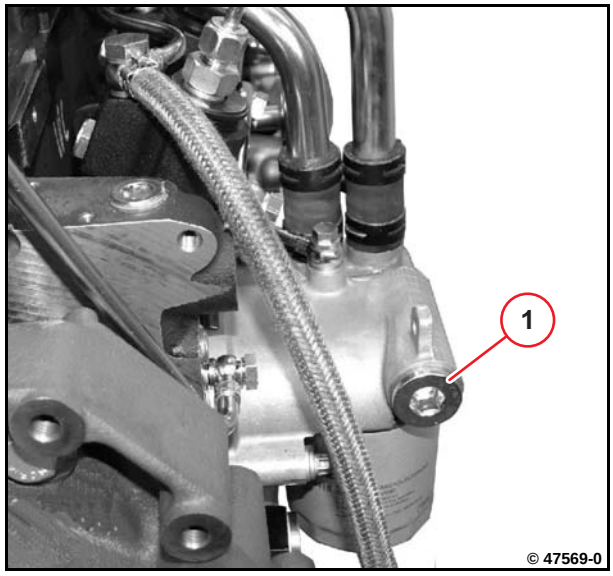
Special tools:
– Disassembly tool. 110901

Collect leaking operating substances in suitable vessels and dispose of according to regulations.

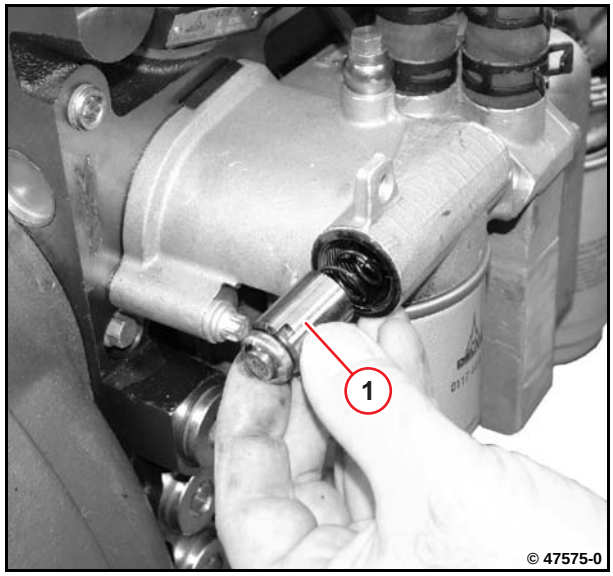
Removing the thermostat

Attention!
Parts are under tensions and can spring out during disassembly!

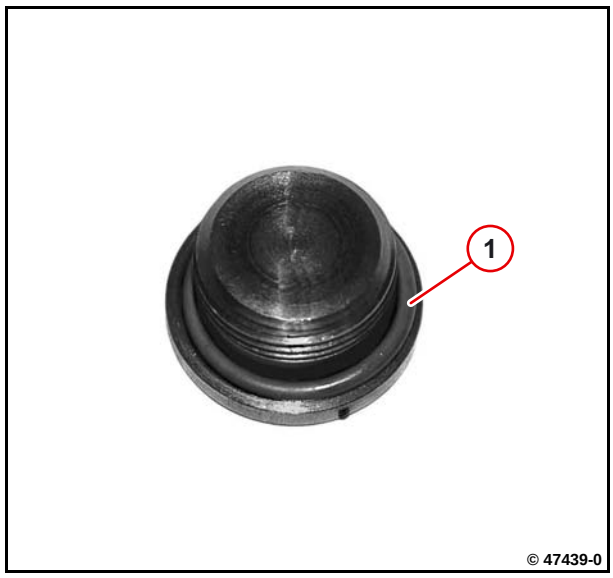
- Unscrew locking screw (1).



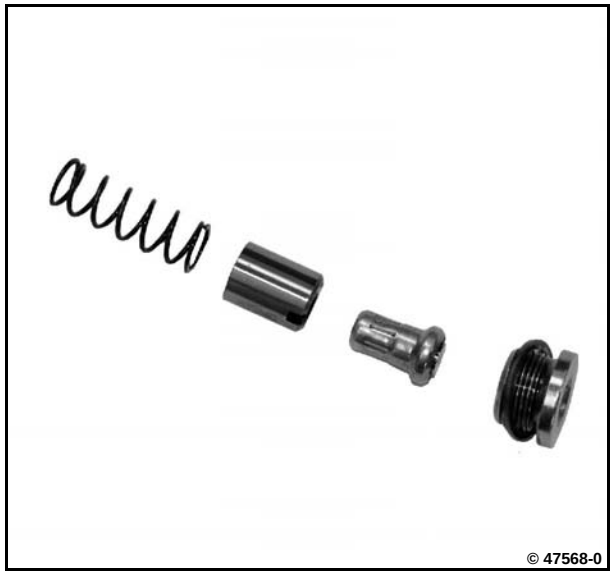
- Remove thermostat (1).
- Remove compression spring.



- Remove the O-ring (1) with the disassembly tool.



- Visually inspect the components.

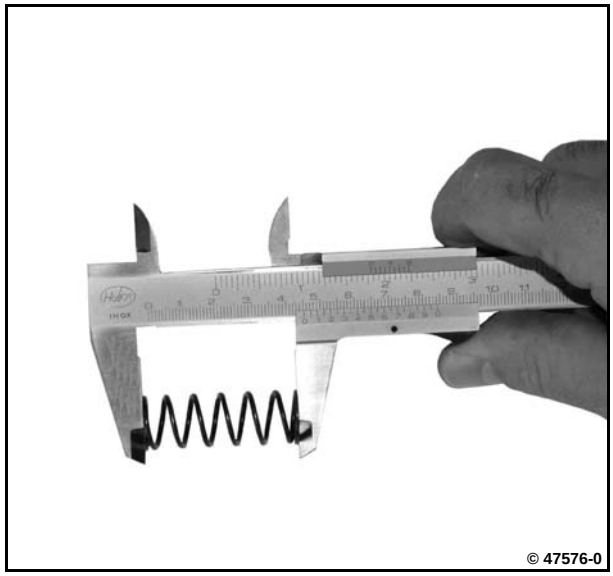


Installing the thermostat

- Measure length of the compressor spring with calliper gauge.

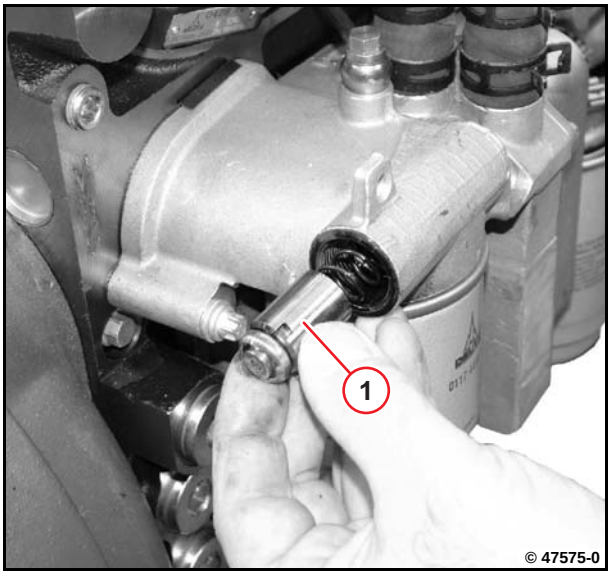
45.7 mm

When the wear limit is reached, the compressor spring must be renewed.

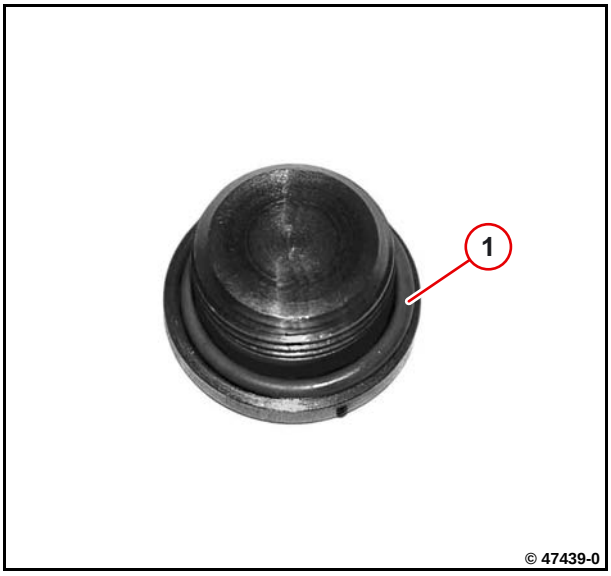


- Clean sealing surfaces.
- Oil the thermostat lightly.
- Insert compression spring.
- Insert thermostat (1).

Note installation position.

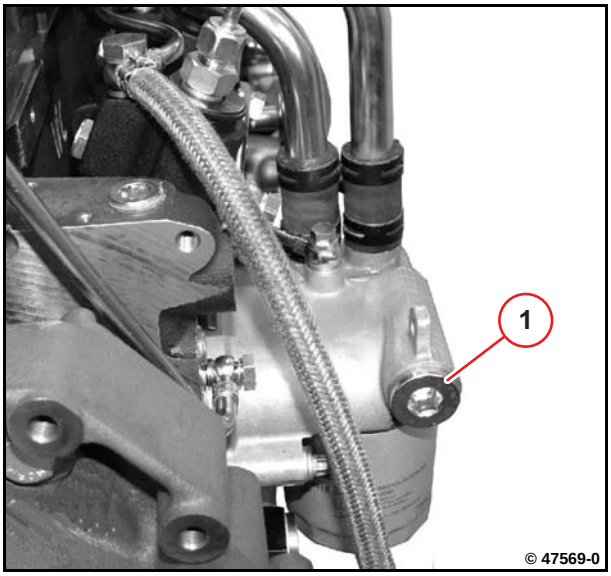


- Lightly oil new O-ring (1).
- Insert new O-ring (1).



- Tighten screw plug (1).

90 Nm



Technical Data

Testing and setting data

ID no.	Name	Additional information	Value
P08 74	Thermostat, compression spring, length		45.7 mm

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A08 072	Thermostat on crankcase, locking screw,			90 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing the control line

Commercial available tools

– W 07-10-08
– W 08-11-07

Collect leaking operating substances in suitable vessels and dispose of according to regulations.

Emptying and filling the engine with operating media must be carried out according to the operating manual and the appropriate documentation of the vehicle/equipment manufacturer.

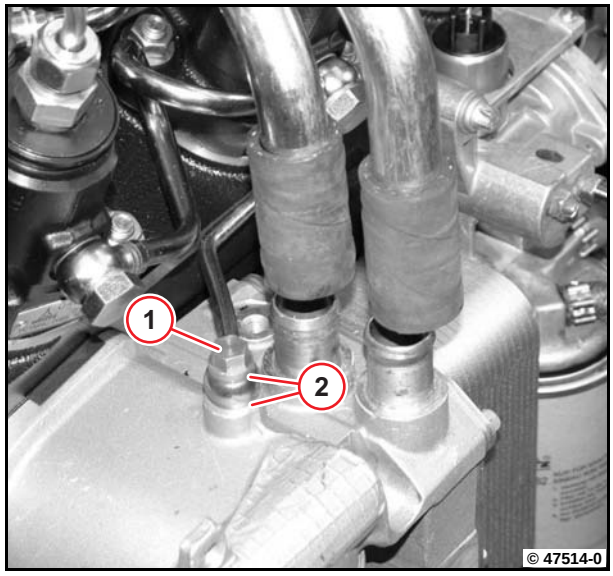
6

Removing control line

- Unscrew hollow screw (1).
- Remove sealing rings (2).
- Remove fuel filter console.

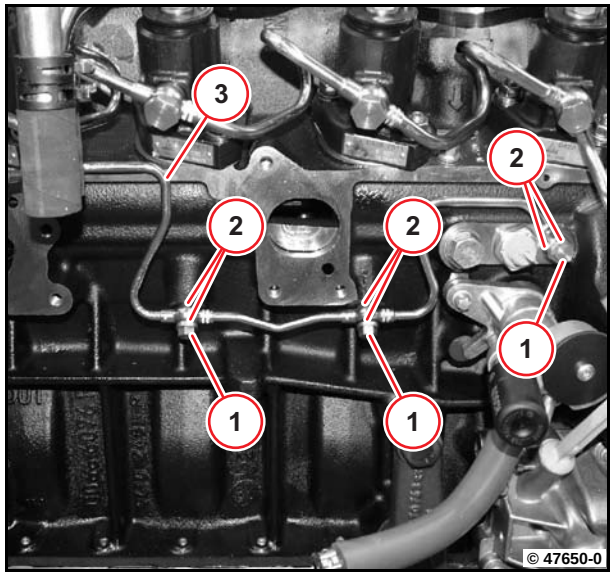
  W 07-10-08
- Remove oil filter console.

  W 08-11-07

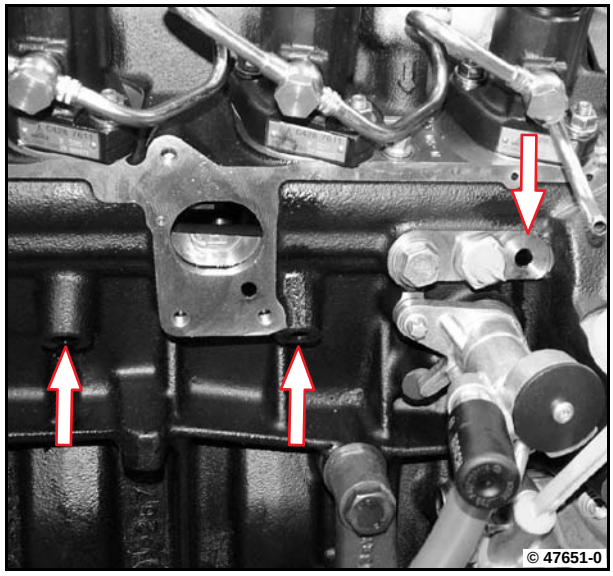


- Unscrew hollow screws (1).
- Remove sealing rings (2).
- Remove control line (3).

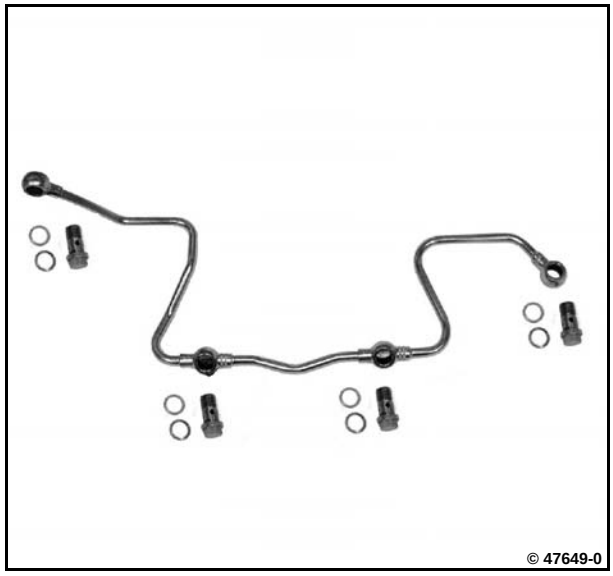
Collect draining lubricating oil and dispose of properly.



- Visually inspect sealing surfaces (arrows).



- Visually inspect the components.

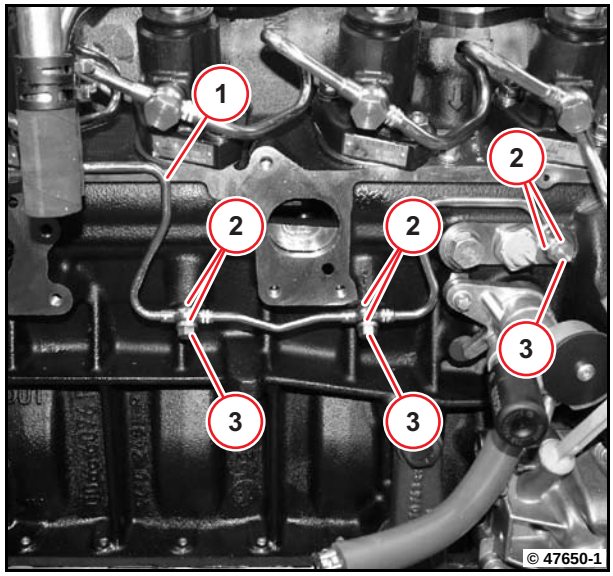


Installing control line

- Insert control line (1).
- Mount sealing rings (2).
- Screw in all hollow screws.
- Tighten hollow screws (3).

18 Nm

Attention!
Install tension-free.



- Install the fuel filter console.

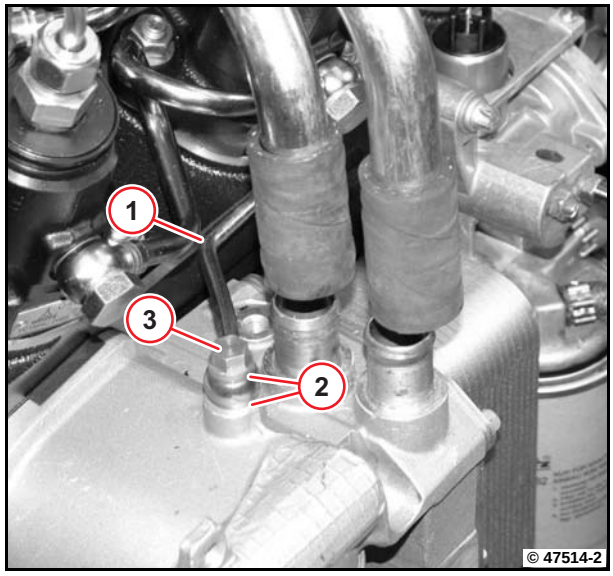
  W 07-10-08

- Mount oil filter console.

  W 08-11-07

- Insert control line (1).
- Mount sealing rings (2).
- Tighten hollow screw (3).

  18 Nm



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A08 048	Control line to oil filter console / crank-case	Hollow screw M10x1		18 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing the coolant pump

Commercial available tools

Special tools:
– Disassembly tool. 110901

– Operation manual
– W 13-02-03

Collect leaking operating substances in suitable vessels and dispose of according to regulations.
The appropriate documentation of the vehicle/equipment manufacturer should be observed for emptying and filling the cooling system.

6

Removing coolant pump

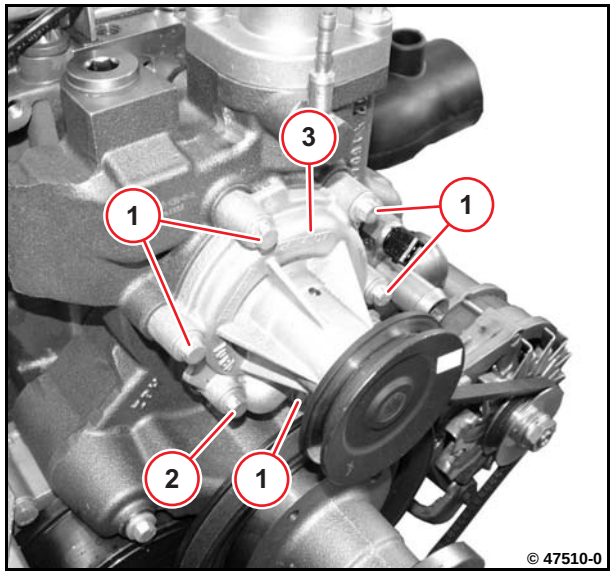
- Remove V-belt.

  W 13-02-03

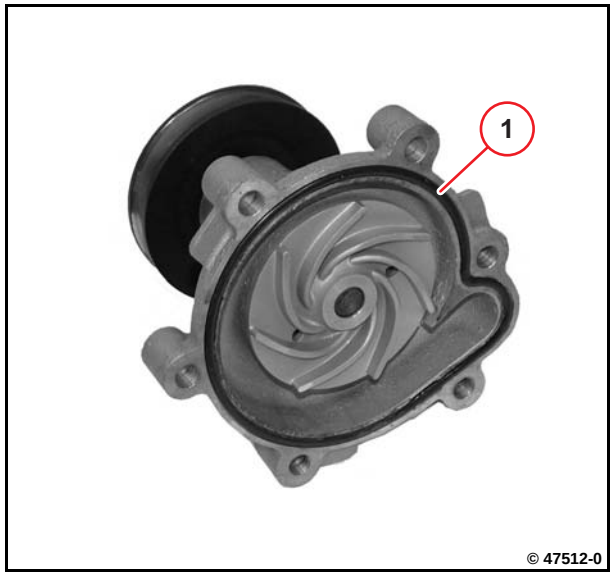
Pay attention to different screw lengths.

- Unscrew screws (1).
- Unscrew screw (2).
- Remove coolant pump (3).

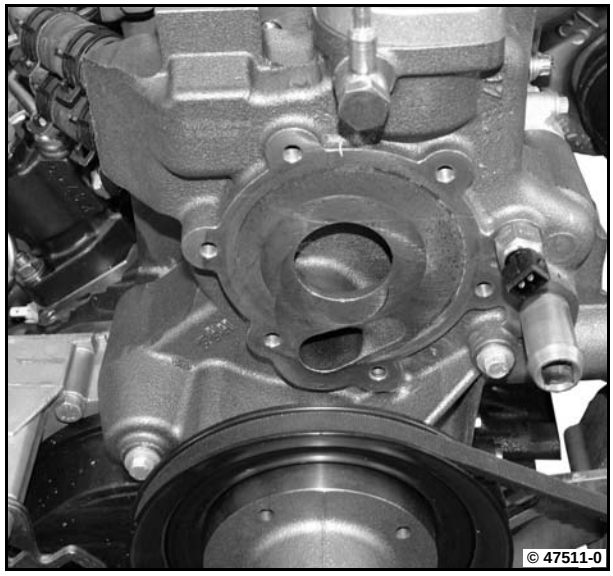
Collect and dispose of coolant according to regulations.



- Remove the O-ring (1) with the disassembly tool.
- Clean sealing surfaces.
- Check components for visible signs of wear.



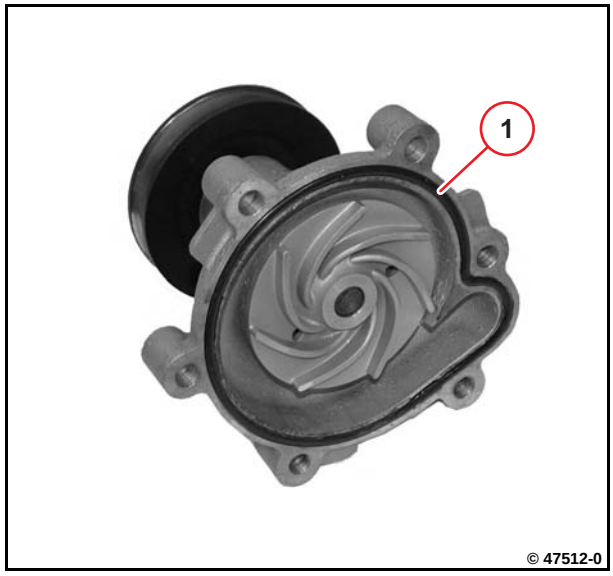
- Clean sealing surfaces.



6

Installing coolant pump

- Clean sealing surfaces.
- Insert new O-ring (1).



- Mount coolant pump (1).

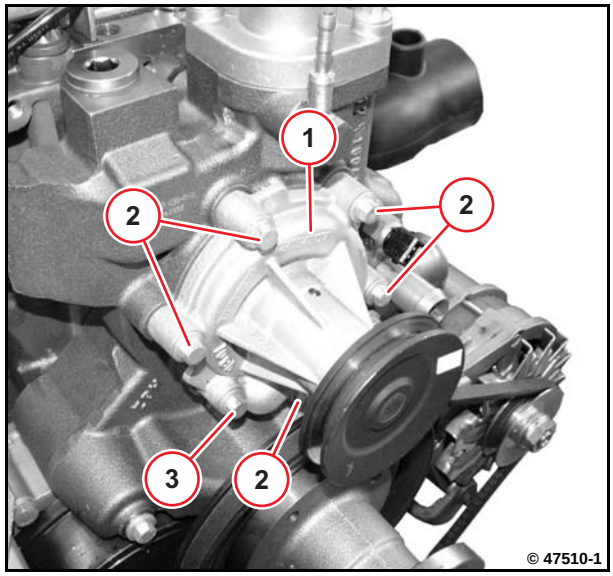
Pay attention to different screw lengths.
Screws M8 x 35 mm (2)
Screw M8 x 100 mm (3)

- Tighten screws (2).

20 Nm

- Tighten screw (3).

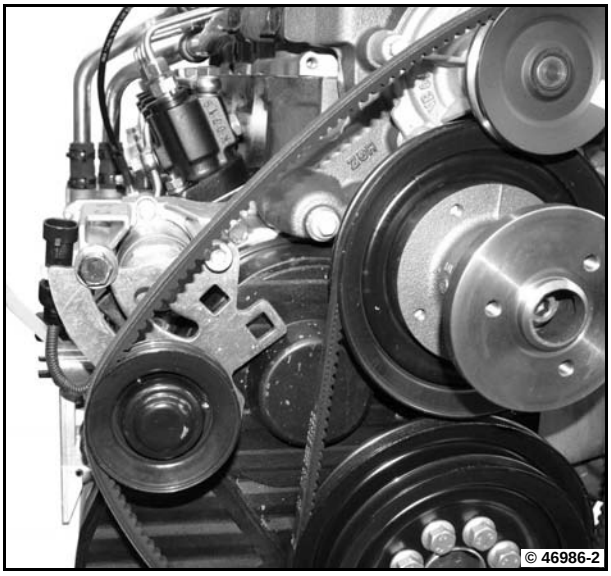
20 Nm



- Install V-belt.

  W 13-02-03

- Fill cooling system according to the operating manual.



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A09 010	Coolant pump on thermostat housing	M8x35-10.9 M8x100-10.9		20 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Checking the thermostat (in the removed state)

Commercial available tools:
– Thermometer

– W 09-08-02

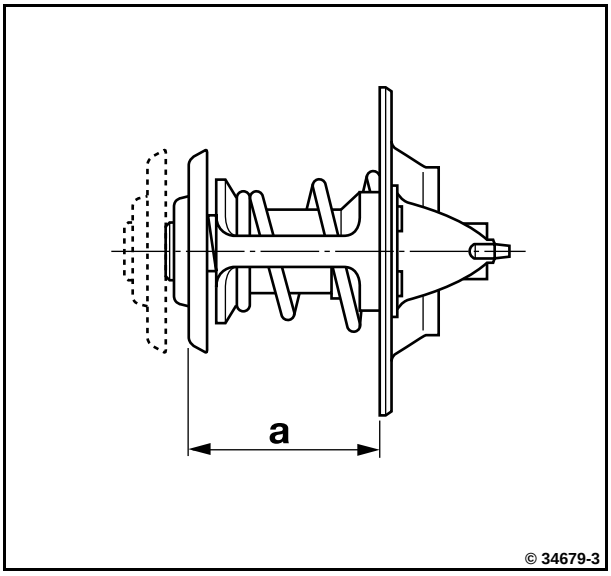
Danger!
Risk of injury!
Hot water and hot thermostat.

Checking thermostat

- Remove thermostat.

  W 09-08-02

- Measure beginning of stroke, dimension (a).
- Note measured value, dimension (a).



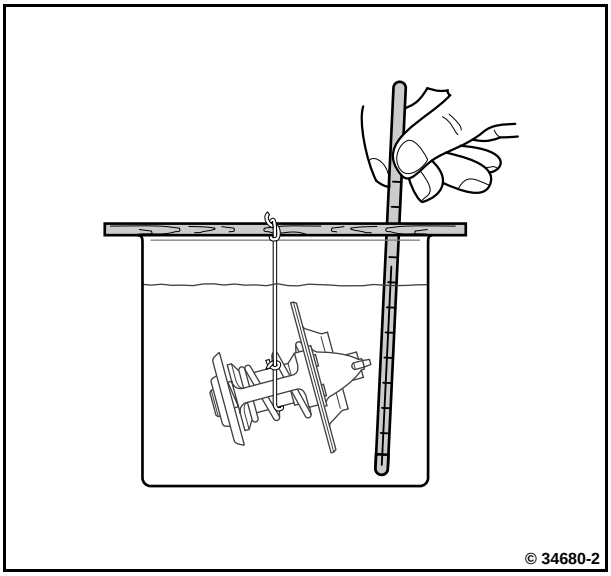
- Heat up the thermostat in the water bath.

In order to determine the exact beginning of opening, the temperature should be measured as close as possible to the thermostat.

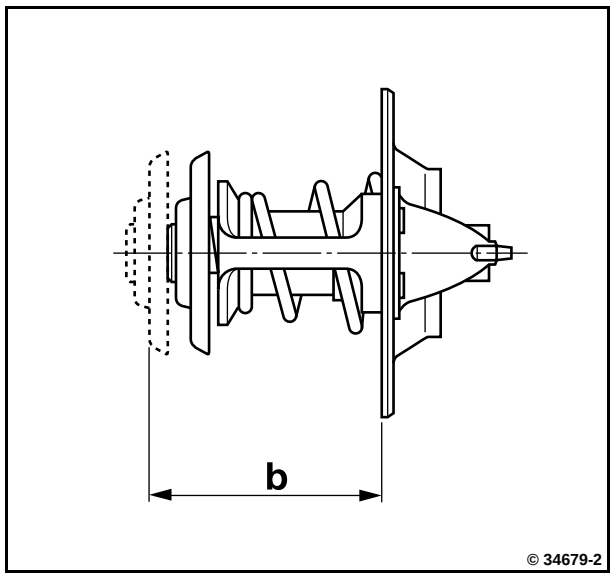
The water should be continuously stirred for an even temperature distribution. The temperature rise should not take place faster than 1°C/min. Otherwise the beginning of opening will be delayed accordingly.

- Determine beginning of opening.

  86 - 90 °C



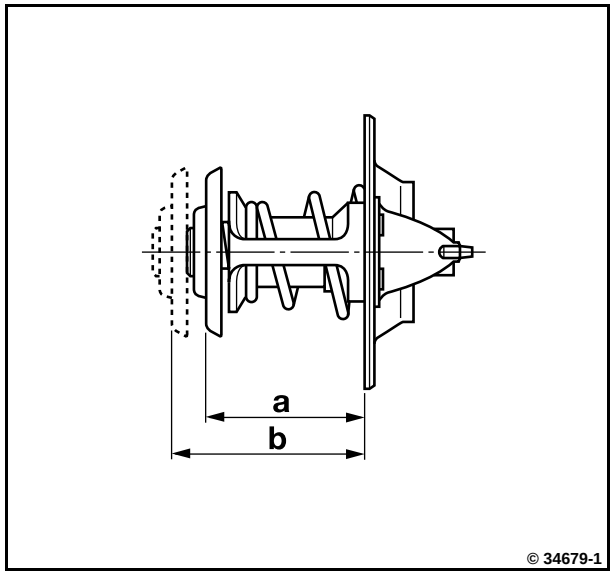
- Measure end of stroke, dimension (b).
- Note measured value, dimension (b).



6

- Determine stroke.

Calculation example	
Desired:	Stroke
Given:	-
Measured:	Beginning of stroke, dimension (a)
	End of stroke, dimension (b)
Calculation:	Dimension (b) - dimension (a)
Result:	= stroke



- Compare result with setpoint value.
  - Nominal value stroke travel:

  at least 9 mm

- Install thermostat.

  W 09-08-01

Technical Data

Testing and setting data

ID no.	Name	Additional information	Value
P09 11	Thermostat, start of opening		86 - 90 °C
P09 13	Thermostat, stroke distance		at least 9 mm

6

Removing and installing the thermostat

Commercial available tools

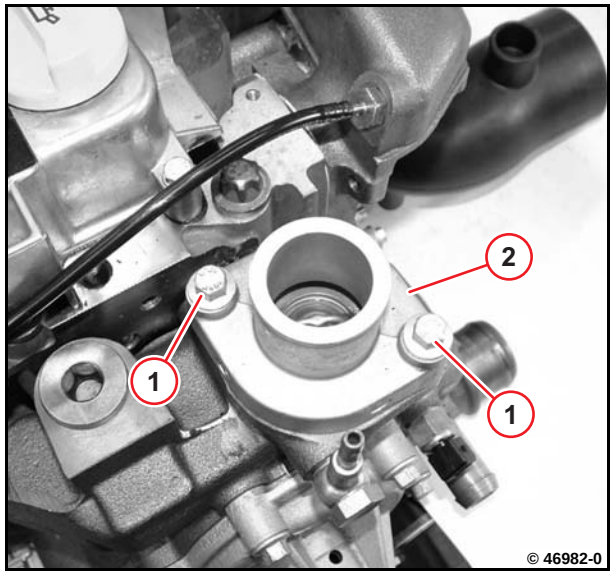
– W 09-08-01

Collect leaking operating substances in suitable vessels and dispose of according to regulations.

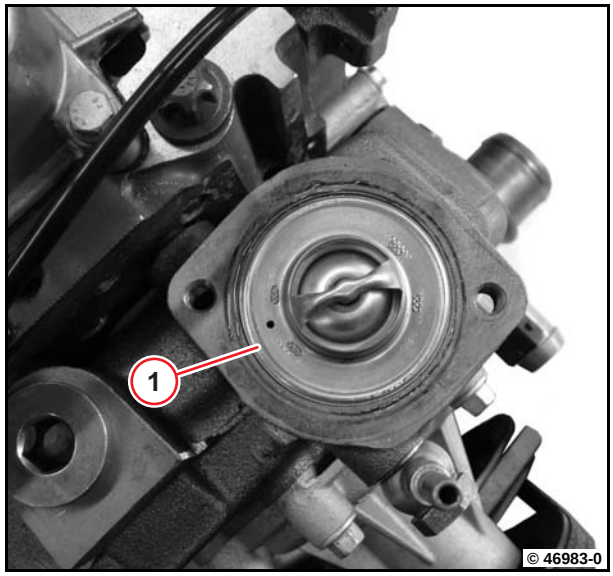
Emptying and filling the engine with operating media must be carried out according to the operating manual and the appropriate documentation of the vehicle/equipment manufacturer.

Removing the thermostat

- Unscrew screws (1).
- Remove outlet nozzle (2).



- Remove O-ring.
- Remove thermostat (1).



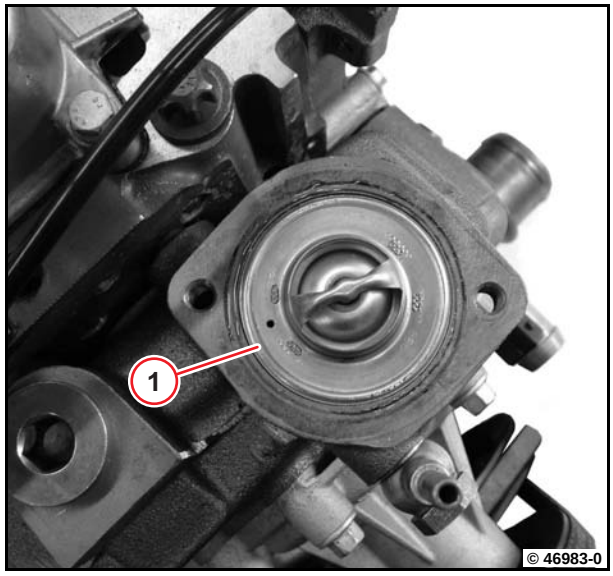
- Check thermostat.

  W 09-08-01

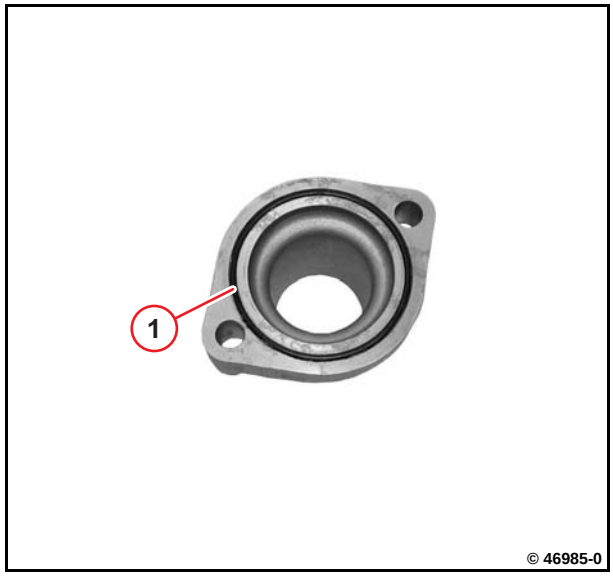
- Visually inspect the components.

Installing the thermostat

- Clean sealing surfaces.
- Insert thermostat (1).

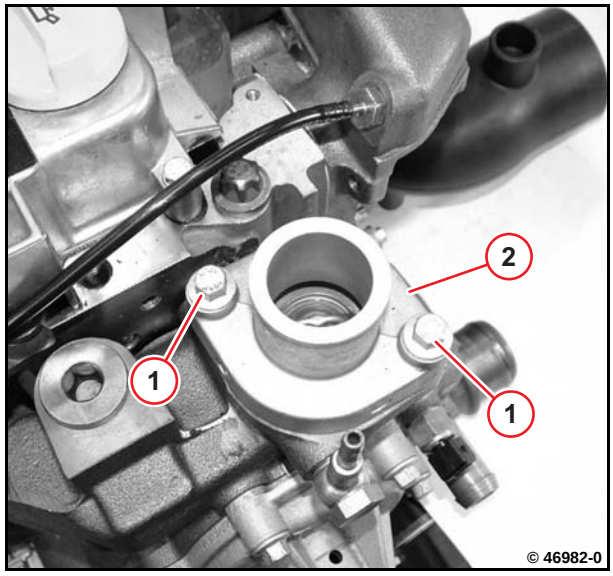


- Clean sealing surfaces.
- Insert new O-ring (1).



- Mount outlet nozzle (2).
- Tighten screws (1).

22 Nm



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A09 002	Outlet nozzles on thermostat housing	M8x30-10.9		22 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing the thermostat housing

Commercial available tools:
– Spring band pliers 9090

Special tools:
– Disassembly tool. 110901

– Fitting compound
DEUTZ AP1908

– Operation manual
– W 12-02-01

Collect leaking operating substances in suitable vessels and dispose of according to regulations.
The appropriate documentation of the vehicle/equipment manufacturer should be observed for emptying and filling the cooling system.

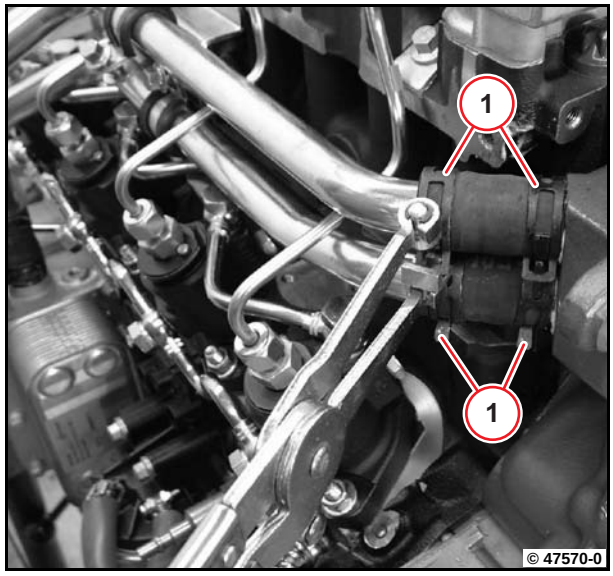
6

Removing thermostat housing

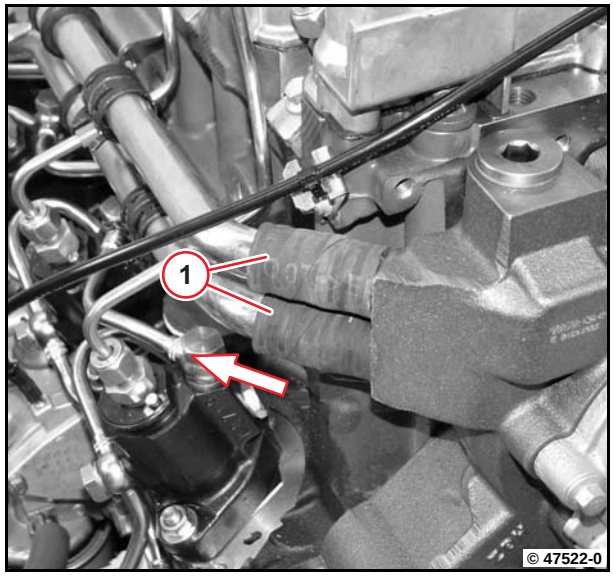
- Remove V-belt.

  W 12-02-01

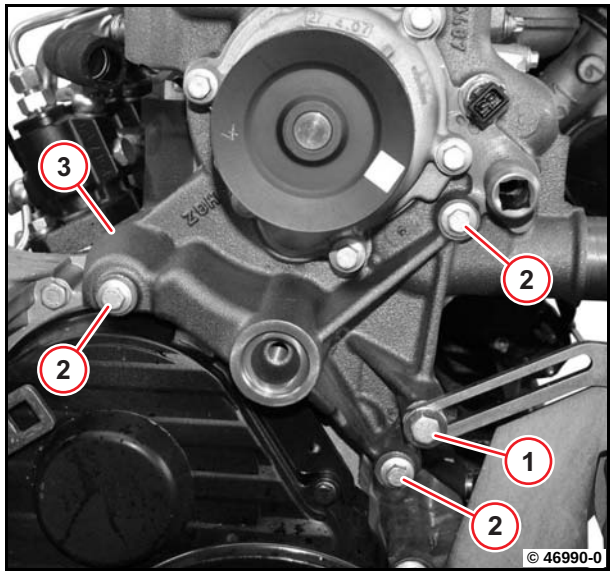
- Loosen spring band clip (1) with spring band pliers.



- Pull off hose pieces (1) in the direction of the arrow.

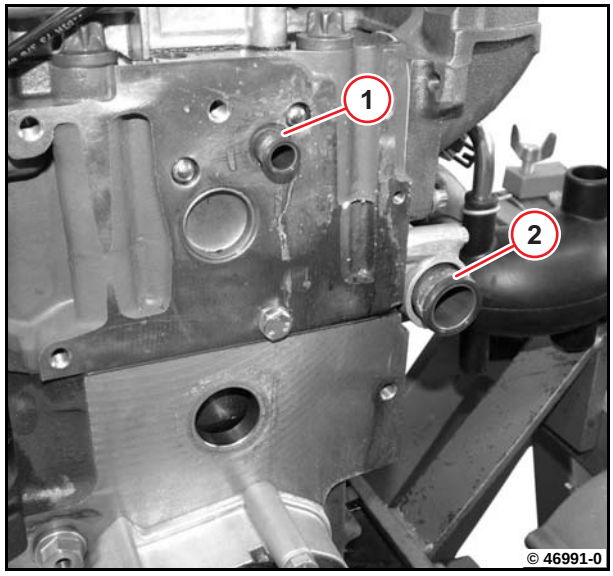


- Unscrew screw (1).
- Unscrew screws (2).
- Remove the thermostat housing (3).

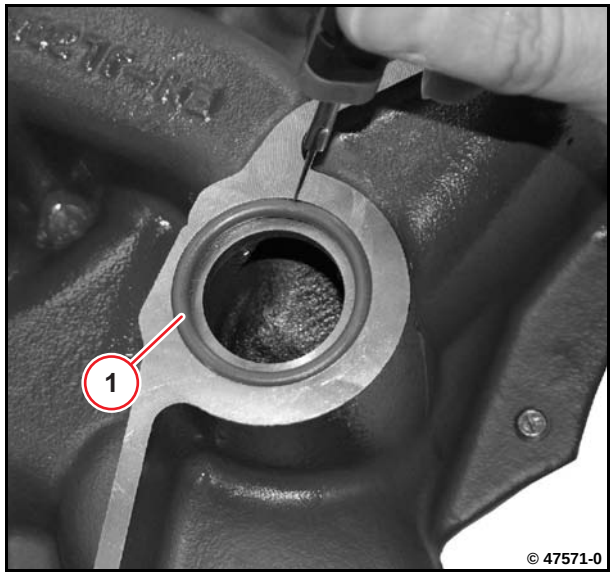


6

- Pull out plug element (1).
- Pull out plug element (2).

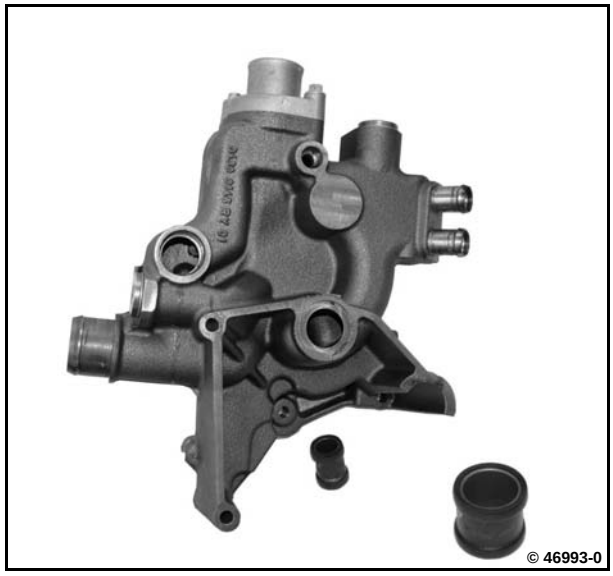


- Remove the O-ring (1) with the disassembly tool.

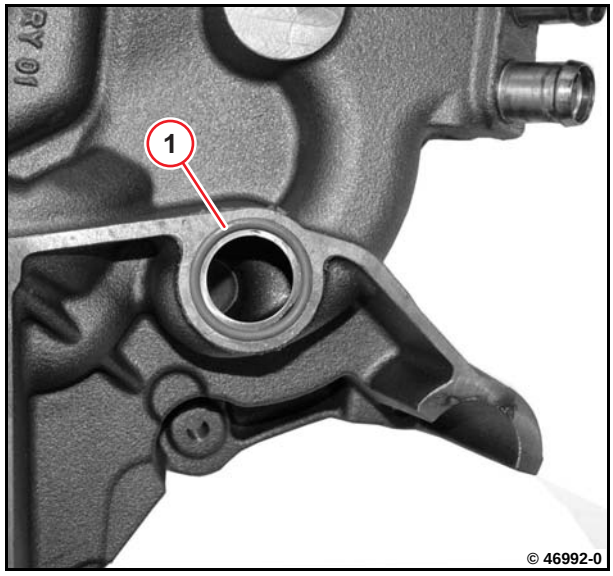


Installing thermostat housing

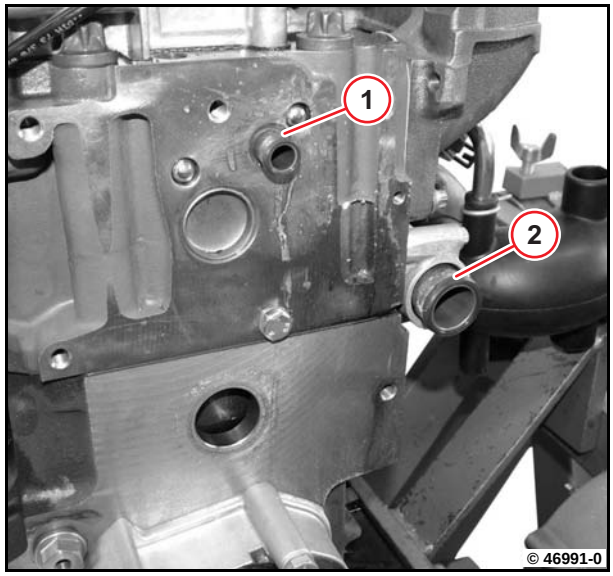
- Clean all sealing surfaces.
- Visually inspect the components.



- Insert new O-ring (1).



- Insert plug element (1).
- Insert plug element (2).



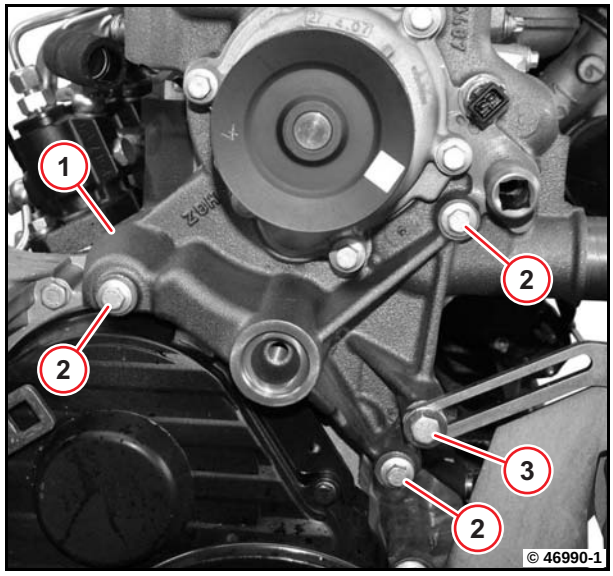
- Mount thermostat housing (1).

Ensure that the installation location is free from faults.

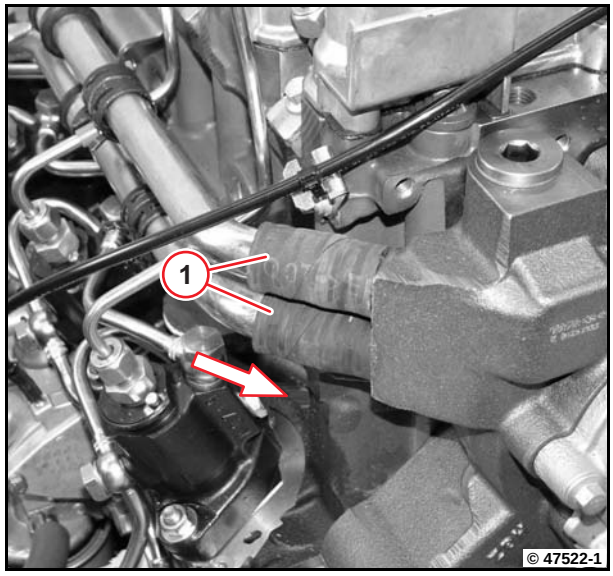
- Tighten screws (2).

34 Nm

- Turn in screw (3).

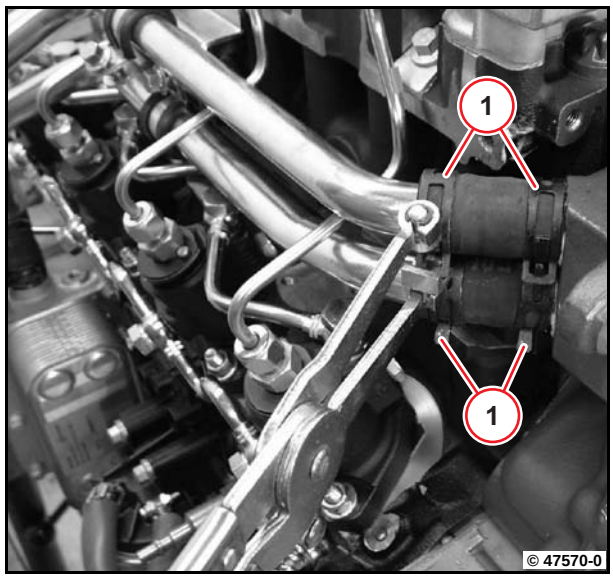


- Coat hose pieces with mounting compound.
- Push on hose pieces (1) in the direction of the arrow.



- Position the spring band clip (1) with the spring band pliers.
- Install V-belt.
- Check V-belt tension.

W 12-02-01



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A09 001	Thermostat housing to crankcase	M8x100-10.9		34 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

Removing and installing temperature transmitter

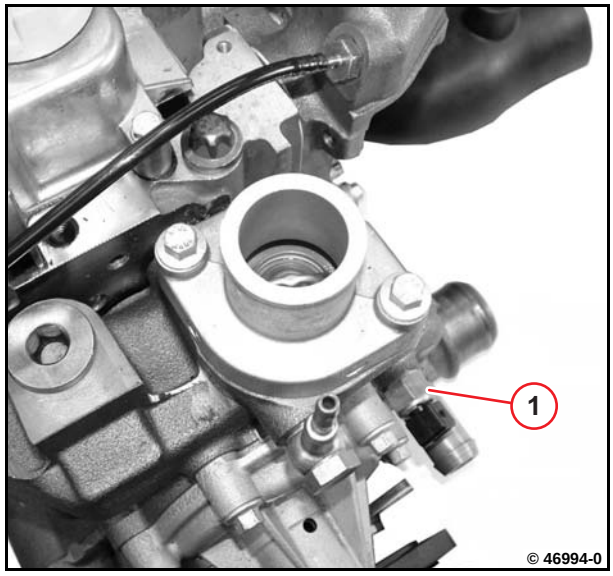
Commercial available tools

Collect leaking operating substances in suitable vessels and dispose of according to regulations.

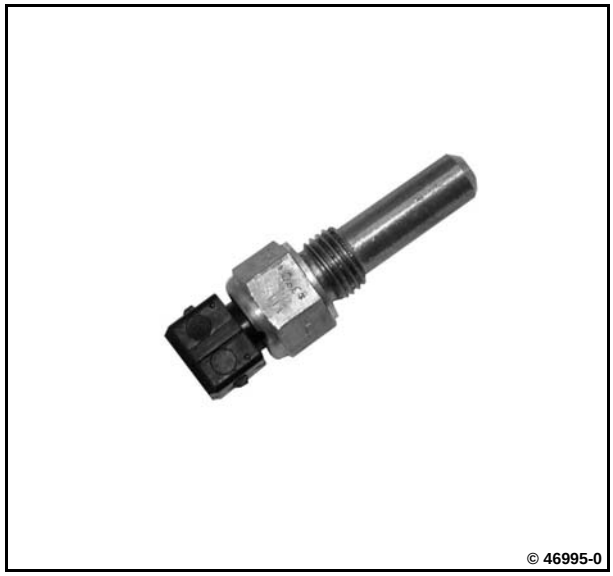
Emptying and filling the engine with operating media must be carried out according to the operating manual and the appropriate documentation of the vehicle/equipment manufacturer.

Removing temperaure transmitter

- Disconnect cable connections.
- Unscrew temperature transmitter (1).



- Visually inspect the component.



Installing temperature transmitter

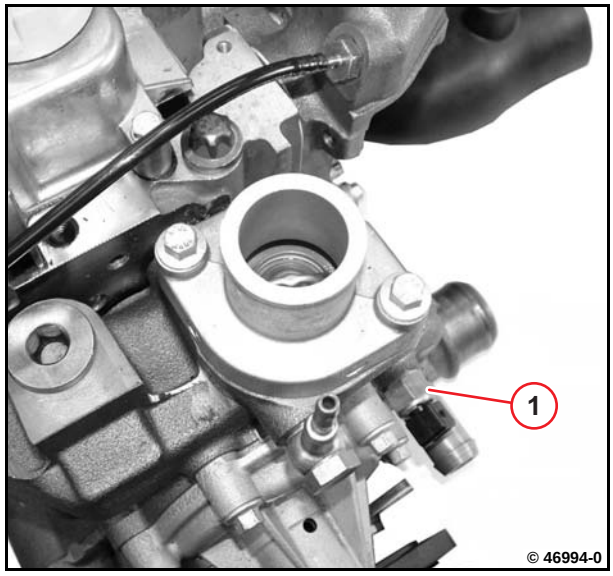
- Tighten temperature transmitter (1).

  25 Nm

Make sure the sealing ring is in place.

- Connect cable.

Ensure that the connection is perfect.



6

Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A09 031	Temperature transmitter on thermo-stat housing			25 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

Removing and installing the lifting magnet (Engine shutdown)

Commercial available tools

Special tools:
– Disassembly tool. 110901

– W 12-02-01

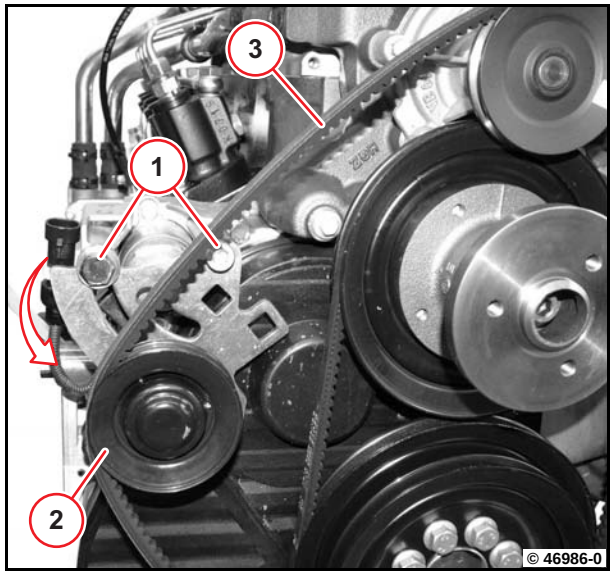
Remove lifting magnet

– **Version with V-belt tensioning pulley**

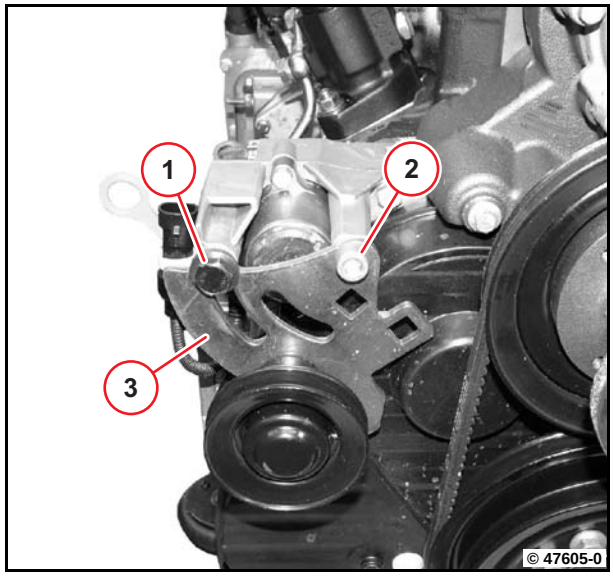
- Remove V-belt.

  W 12-02-01

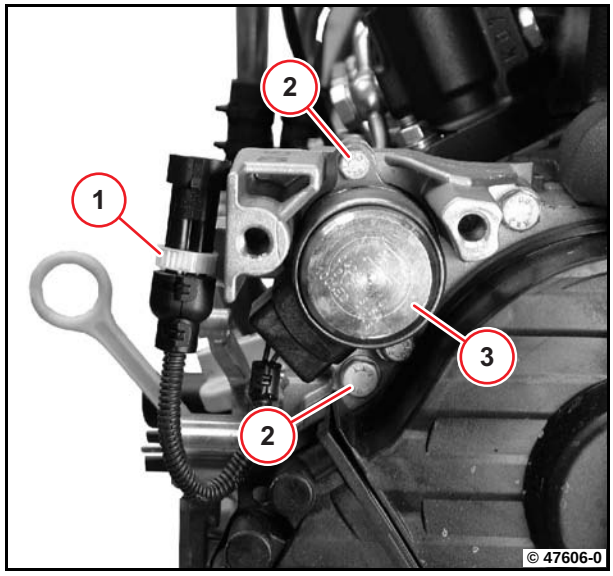
- Loosen screws (1).
- Swing V-belt tensioning pulley (2) in the direction of the arrow.
- Remove V-belt (3).



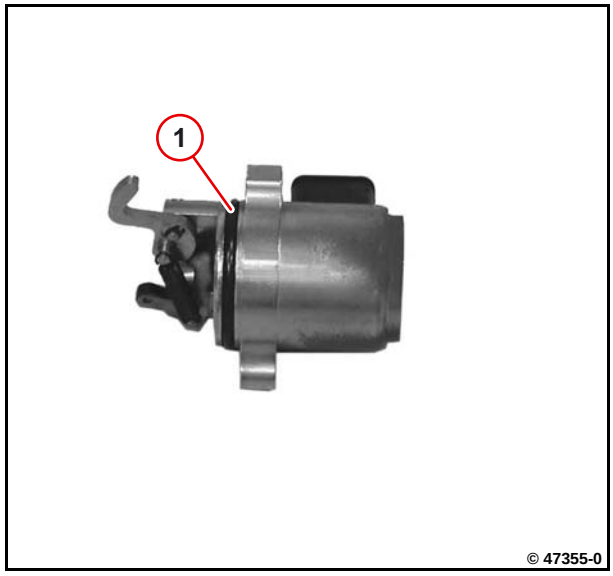
- Unscrew screw (1).
- Unscrew screw (2).
- Remove V-belt tensioning pulley (3).



- Remove cable tie (1).
- Unscrew screws (2).
- Remove lifting magnet (3).

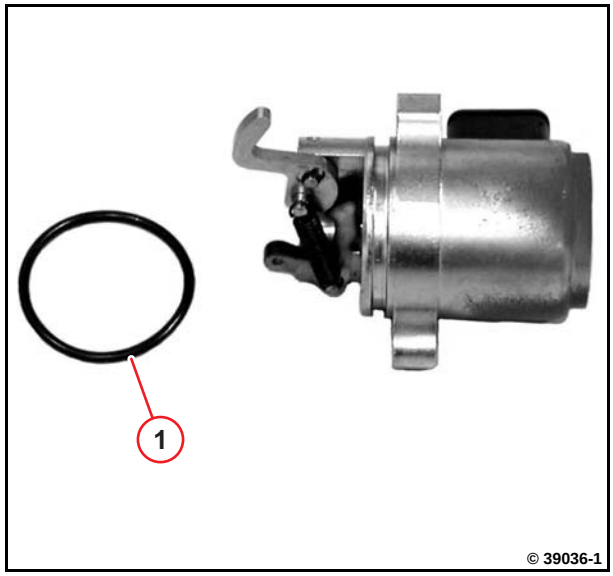


- Remove the O-ring (1) with the disassembly tool.
- Visually inspect the components.



Install lifting magnet

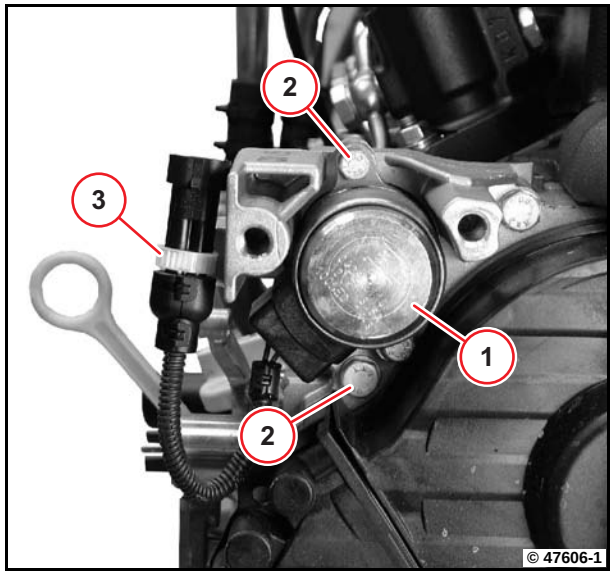
- Insert new O-ring (1).



- Insert lifting magnet (1).
- Tighten screws (2).

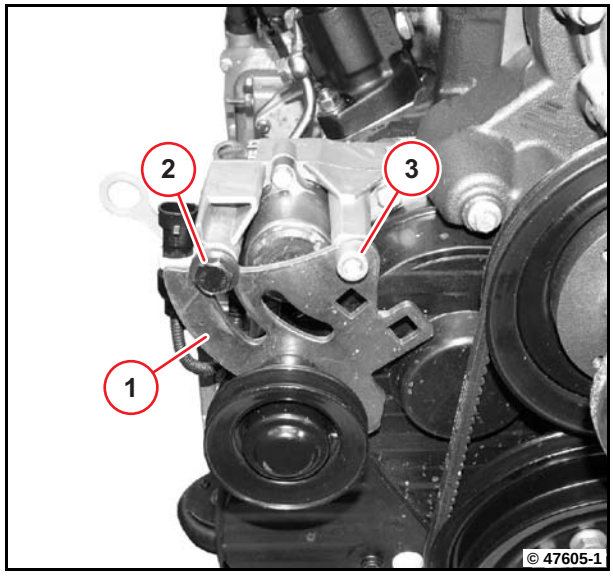
  8.5 Nm

- Fasten cable plug with cable tie (3).



- Mount V-belt tensioning pulley (1).
- Fasten screw (2).
- Turn in screw (3).
- Mount and tighten V-belt.

  W 12-02-01



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A05 041	Lifting magnet (engine shutdown) on front cover			8.5 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing the V-belt pulley

Commercial available tools

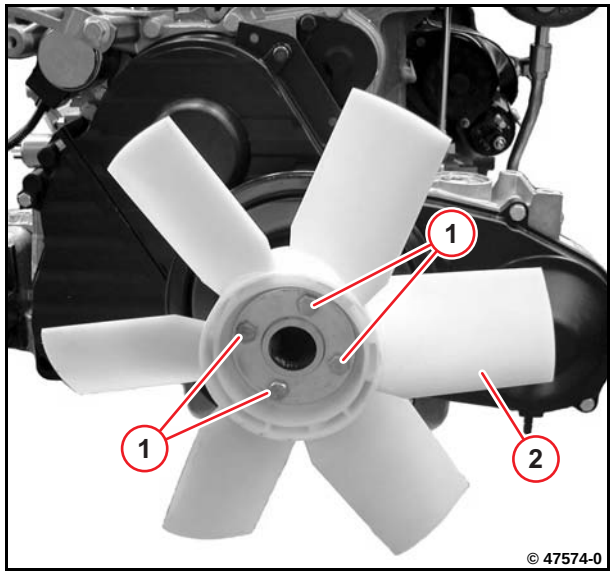
– W 12-02-01

Removing the V-belt pulley

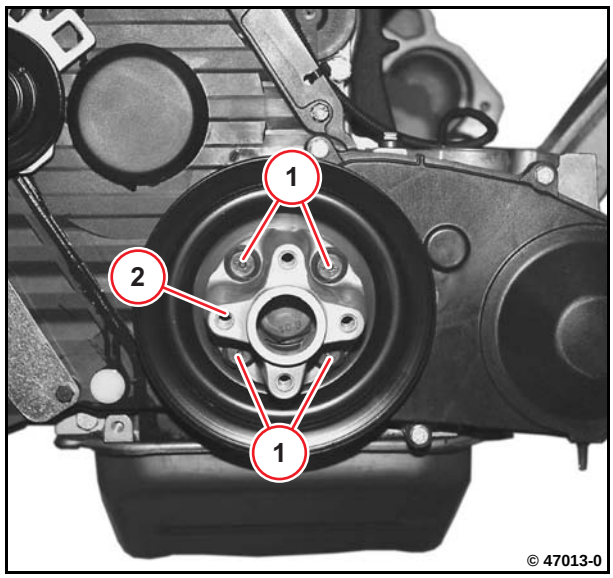
- Remove V-belt.

  W 12-02-01

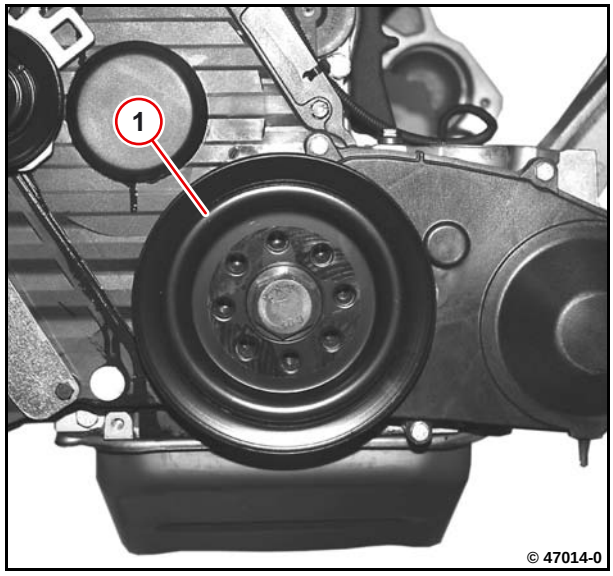
- Unscrew screws (1).
- Remove fan (2).



- Unscrew screws (1).
- Remove flange hub (2).



- Remove V-belt pulley (1).

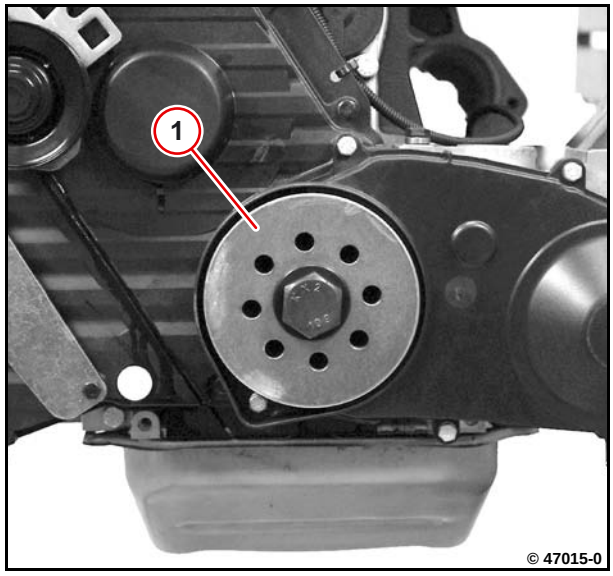


6

- Remove centrifugal disc (1).

Note installation position.

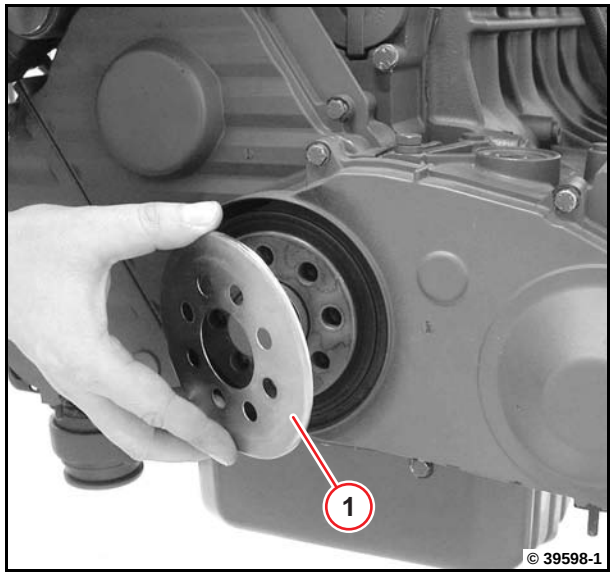
- Visually inspect the components.



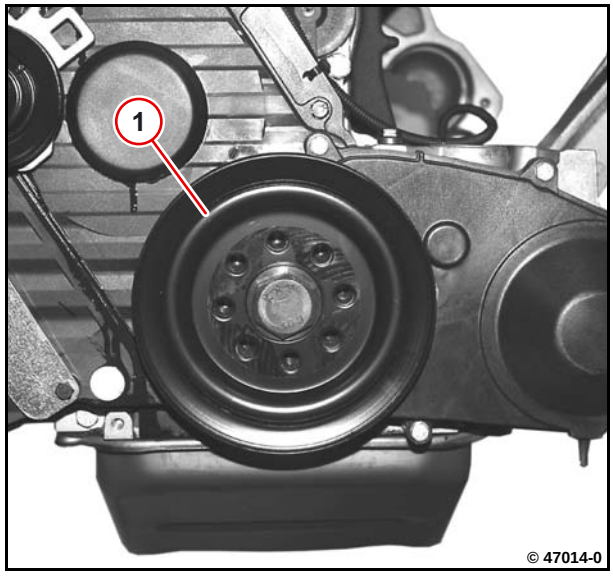
Installing the V-belt pulley

- Mount centrifugal disc (1).

Note installation position.

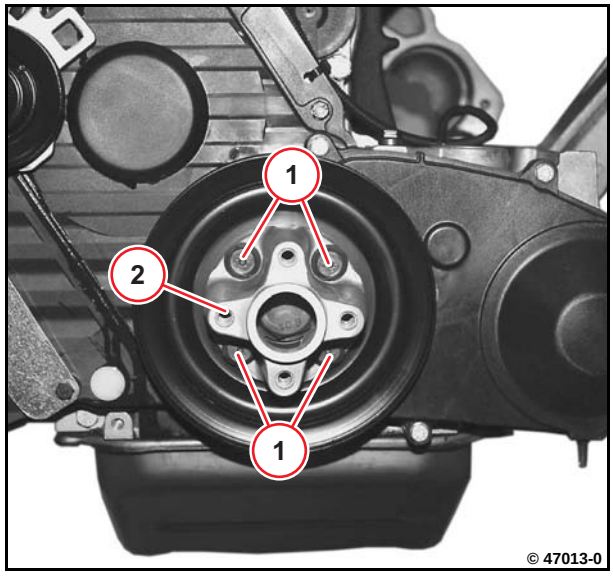


- Mount V-belt pulley (1).



- Mount flange hub (2).
- Tighten screws (1).

  43 Nm



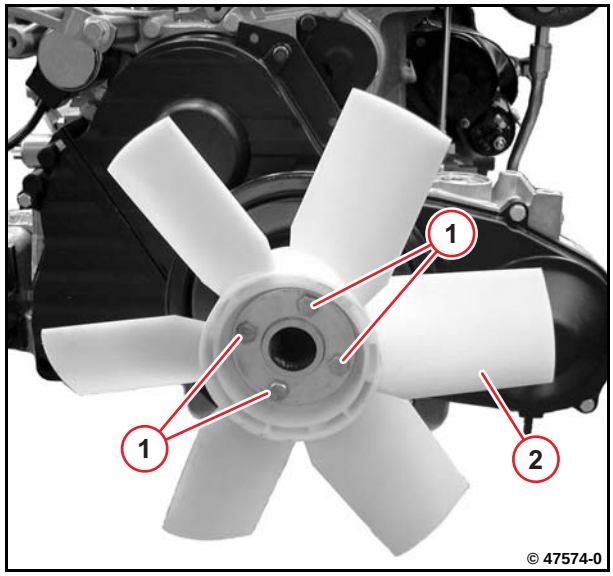
Attention!
Note installation position: "Engine side" label faces engine!

- Mount fan (2).
- Tighten screws (1).

  30 Nm

- Install V-belt.

  W 12-02-01



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A09 042	Ventilator on flange hub	M8x40-10.9		30 Nm
A12 031	V belt pulley/flange hub on output flange	M10x30-8.8		43 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Renew V-belts, check V-belt tension

Commercial available tools:
– V-belt tension measuring device 8115
– Rotation angle disc 8190

Attention!
Only test / tighten / renew V-belts when the engine is not running.

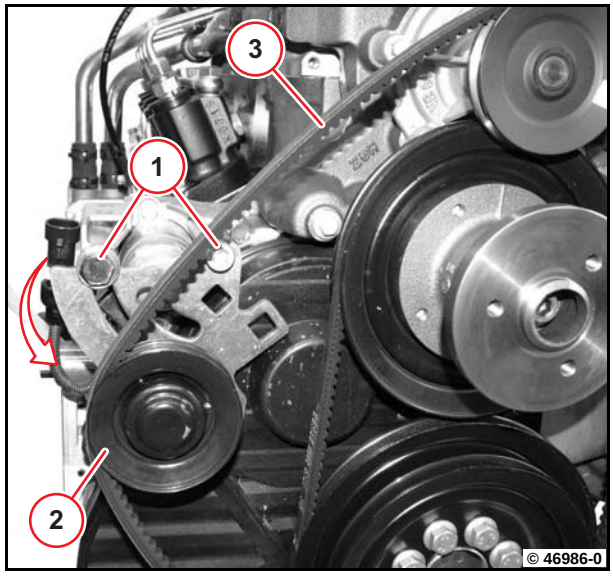
The V-belt tension of new V-belts must be checked after they have been running for 15 minutes.

6

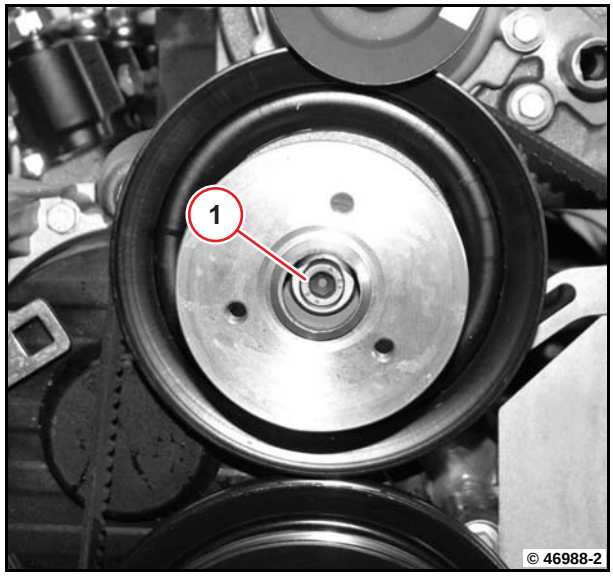
Removing the V-belt

– **Version with V-belt tensioning pulley**

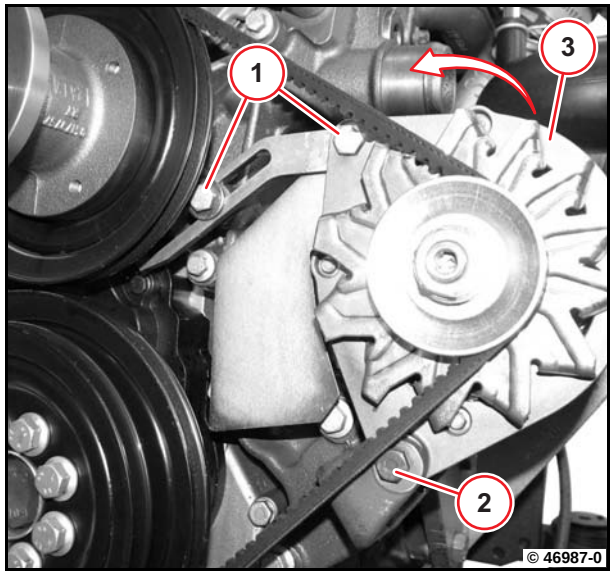
- Loosen screws (1).
- Swing V-belt tensioning pulley (2) in the direction of the arrow.
- Remove V-belt (3).



- Loosen screw (1).



- Loosen screws (1).
- Loosen screw (2).
- Swing generator (3) in the direction of the arrow.



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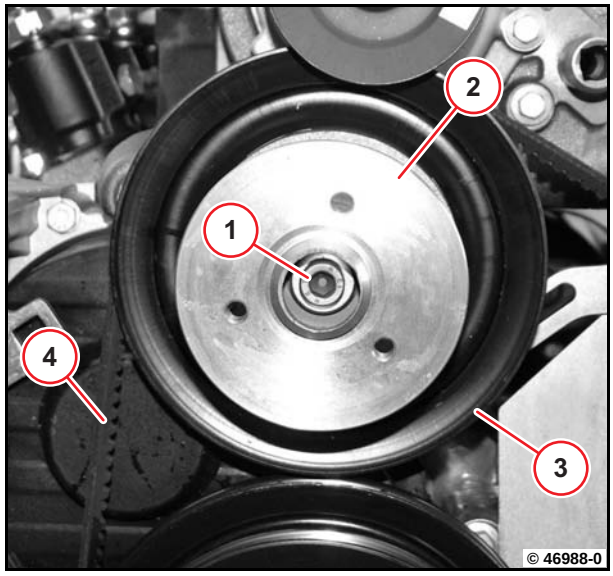
- Unscrew screw (1).
- Remove air bearing (2).
- Remove V-belt pulley (3).
- Remove V-belt (4).

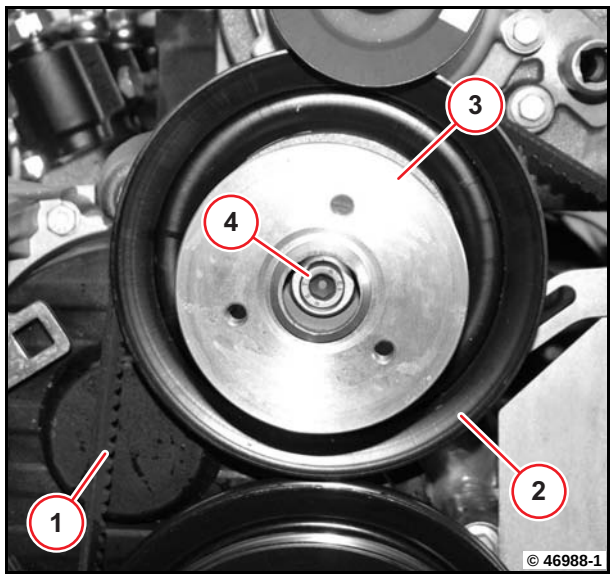


Installing the V-belt.

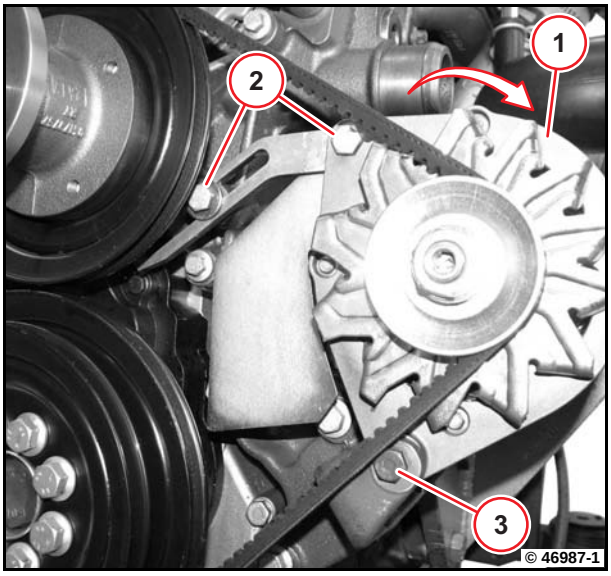
- Mount V-belt (1).

Note V-belt length.

- Mount V-belt pulley (2).
- Insert air bearing (3).
- Turn in screw (4).



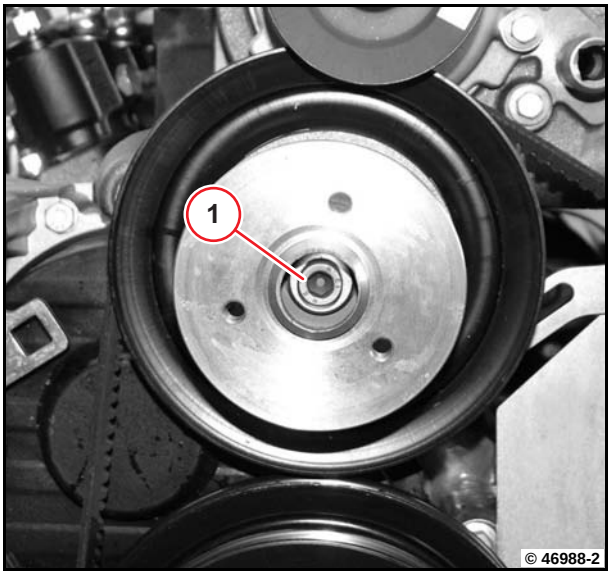
- Swing generator (1) in the direction of the arrow.
- Tighten screws (2).
- Fasten screws (3).



- Tighten new screw (1).
  – Stage 1:

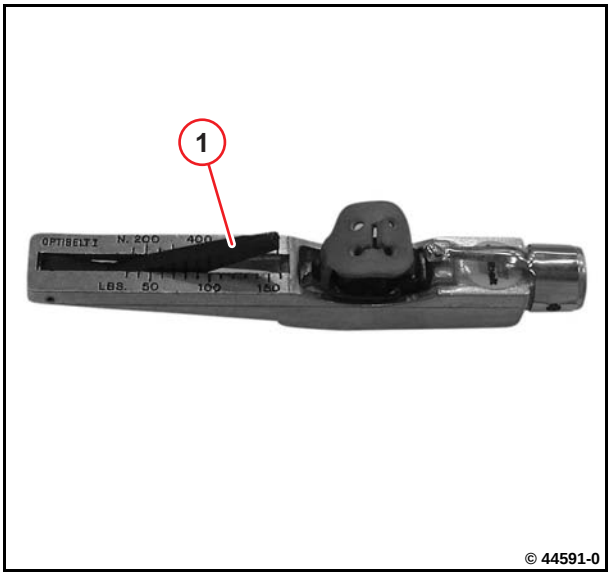
  30 Nm
- Tighten screw (1) with socket wrench insert and rotation angle disc.
  – Stage 2:

  120°



Check V-belt tension with V-belt tension measuring device

- Lower indicator arm (1) into V-belt tension measuring device.



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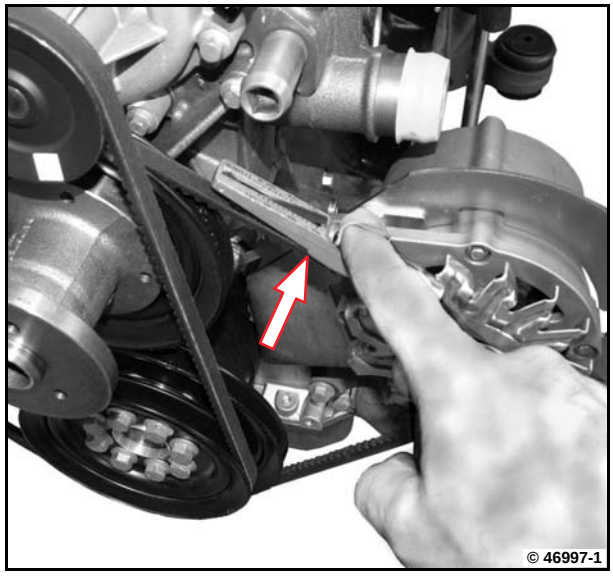
- Mount V-belt tension measuring device on V-belt.

The V-belt must be between the guides (arrow).

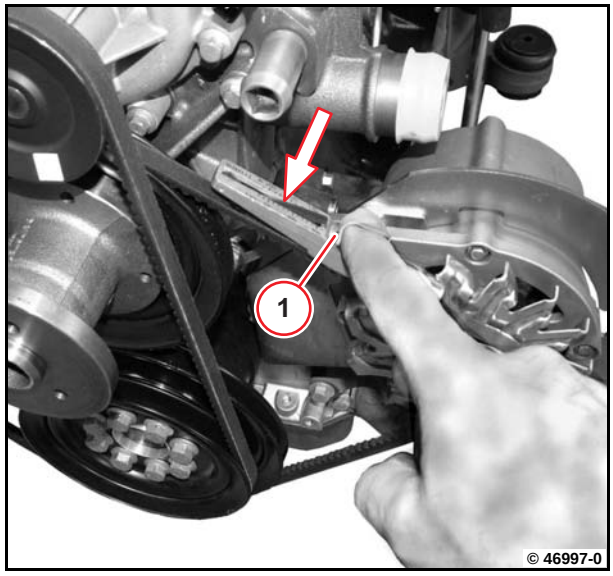


- Press the V-belt measuring device against the V-belt with the button (1) until you hear it click.
- Read measured value at the intersection (arrow) of the indicator arm and scale.

450 $^{+50}_{-50}$ N

Note different units on the scale.

- If the nominal value is not reached, the tensioning process must be repeated.



- Tighten screws (1).

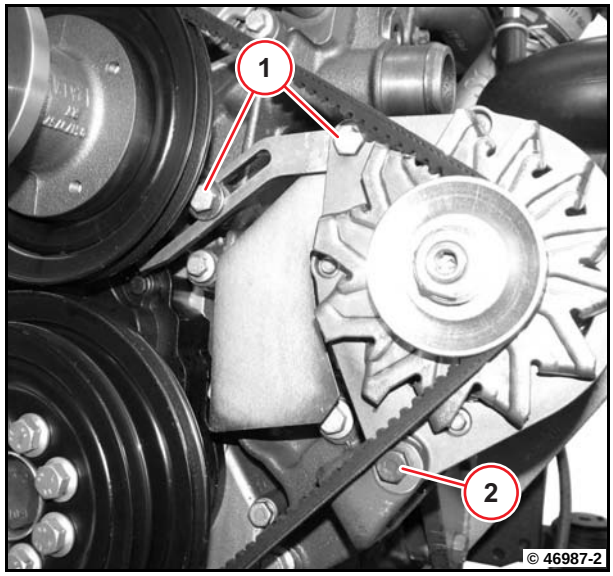
34 Nm

- Tighten screw (2).

22 Nm

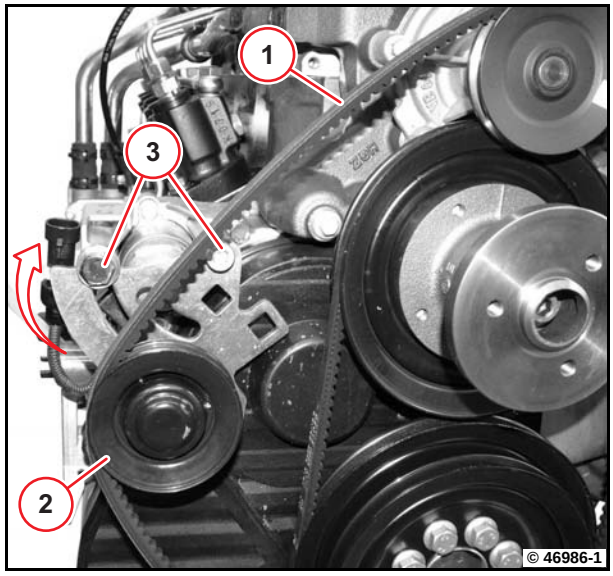
The V-belt tension of new V-belts must be checked after they have been running for 15 minutes.

300 $^{+20}_{-20}$ N

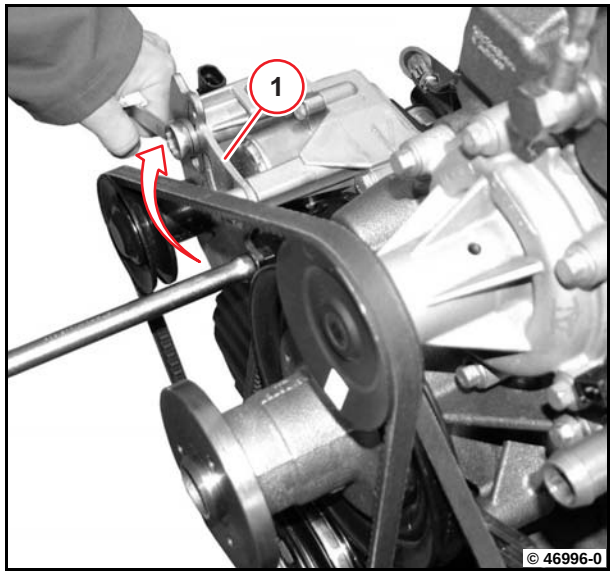


– **Version with V-belt tensioning pulley**

- Mount V-belt (1).
- Swing V-belt tensioning pulley (2) in the direction of the arrow.
- Fasten screws (3).

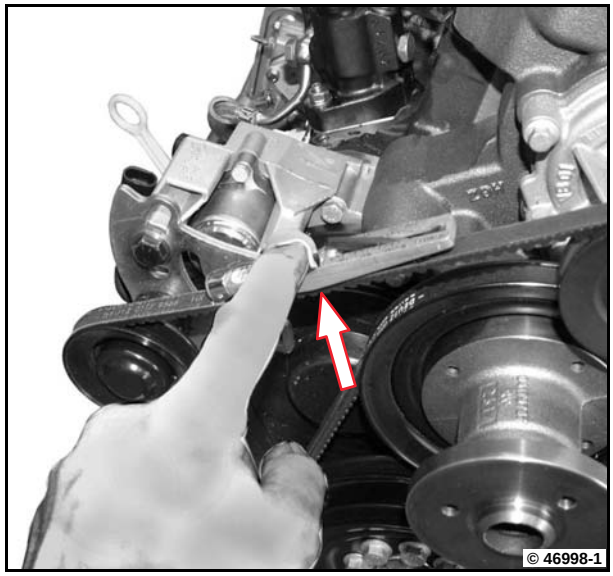


- Press clamping strap (1) in direction of arrow with a suitable tool.



- Mount V-belt tension measuring device on V-belt.

The V-belt must be between the guides (arrow).

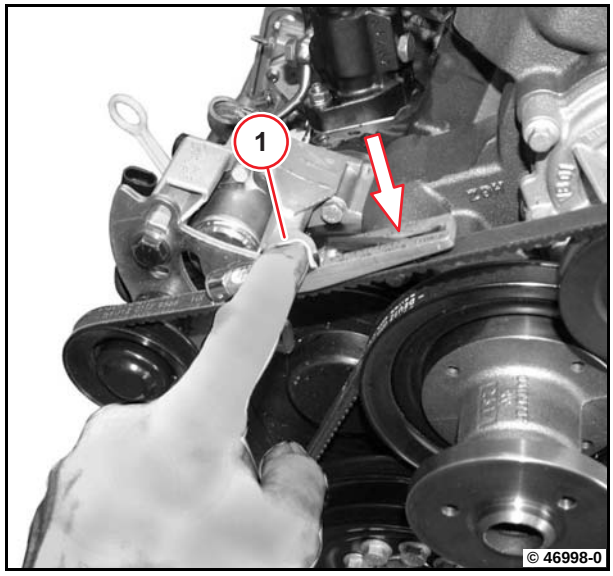


- Press the V-belt measuring device against the V-belt with the button (1) until you hear it click.
- Read measured value at the intersection (arrow) of the indicator arm and scale.

450 $^{+50}_{-50}$ N

Note different units on the scale.

- If the nominal value is not reached, the tensioning process must be repeated.



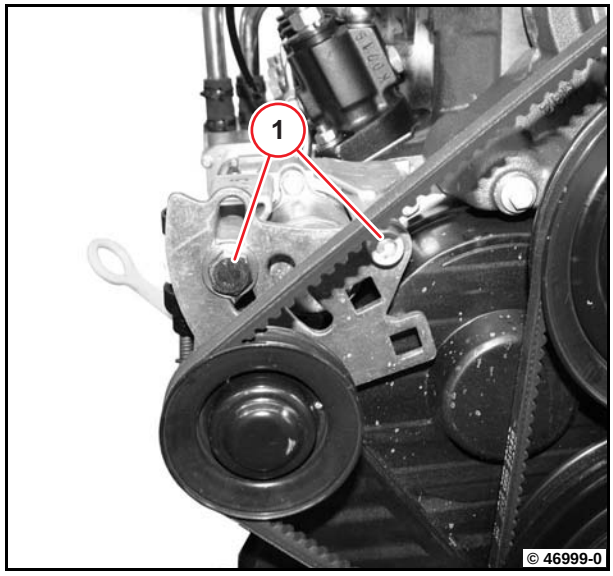
6

- Tighten screws (1).

45 Nm

The V-belt tension of new V-belts must be checked after they have been running for 15 minutes.

300 $^{+20}_{-20}$ N



Technical Data

Testing and setting data

ID no.	Name	Additional information	Value
P12 11	V-belt tension, individual V-belts AVX 10	First assembly	450 $^{+50}_{-50}$ N
P12 21	V-belt tension, individual V-belts AVX 10	Check after 15 minutes running under load	300 $^{+20}_{-20}$ N

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A09 045	Air bearing on console	M10x110-12.9	Stage 1: Use new screw.	30 Nm
A09 045	Air bearing on console	M10x110-12.9	Stage 2:	120°
A12 041	V-belt tensioning pulley (holder) on front cover			45 Nm
A13 012	Generator on console	M8x70-10.9 M8x75-10.9		34 Nm
A13 015	Clamping bracket on generator	M8x30-8.8		22 Nm
A13 016	Clamping bracket on console	M8x35-8.8		22 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

Removing and installing the flywheel

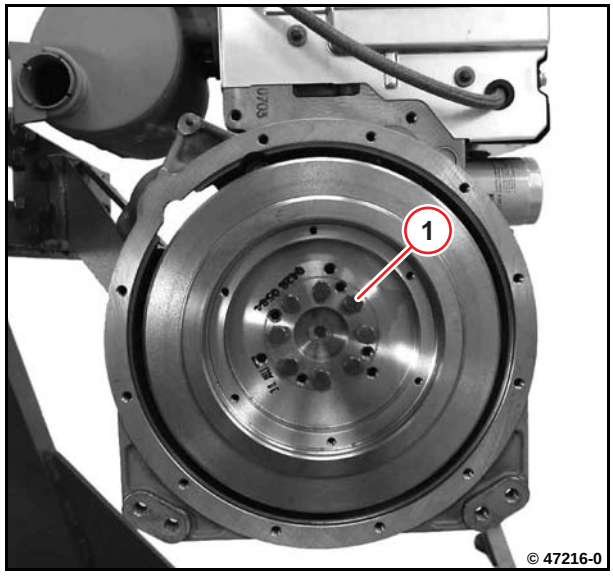
Commercial available tools:
– Self-made mandrin guide
– Rotation angle disc 8190

Removing the flywheel

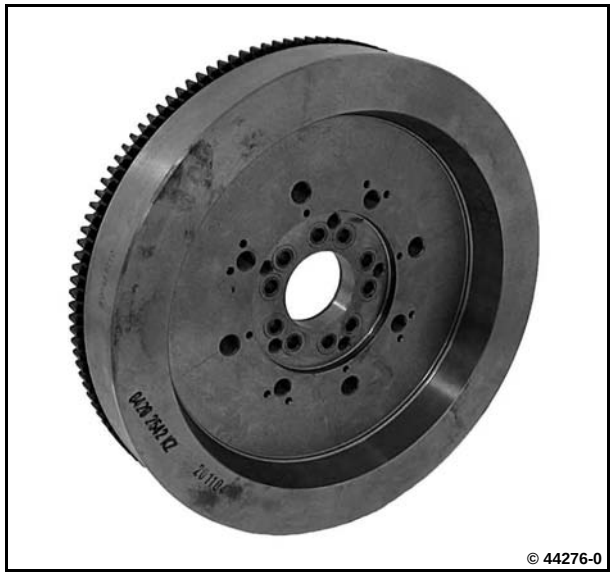
- Block flywheel with suitable tool.
- Unscrew all screws (1).
- Screw two long screws into the threaded bores.

To improve the removal and installation of the flywheel.

- Remove flywheel.



- Visually inspect the components.



Installing the flywheel

- Screw two long screws into the threaded bores.

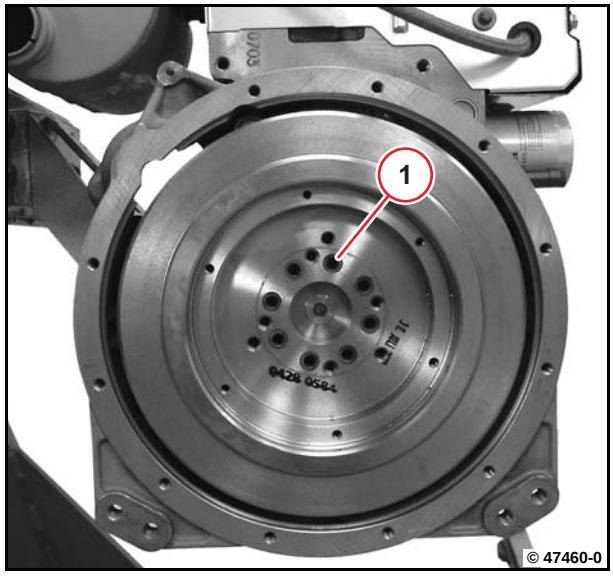
To improve the removal and installation of the flywheel.

- Insert self-made mandrin guide (1).

For example a pin bolt.

- Mount flywheel.

The bores in the flywheel must match the threaded bores in the crankshaft flange.



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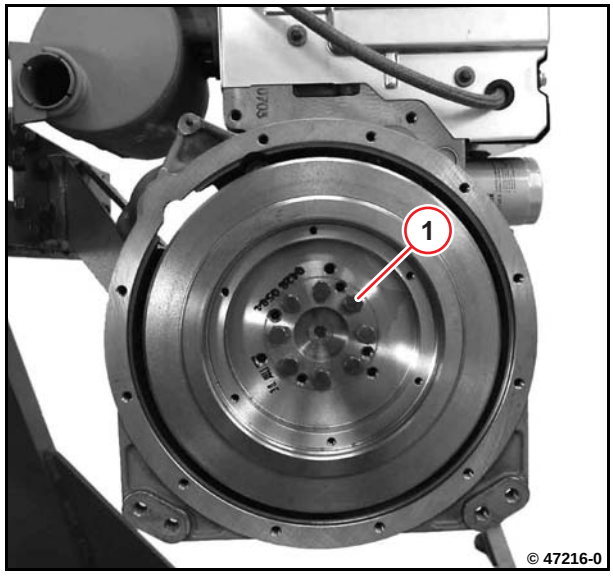
- Turn in new screws (1).

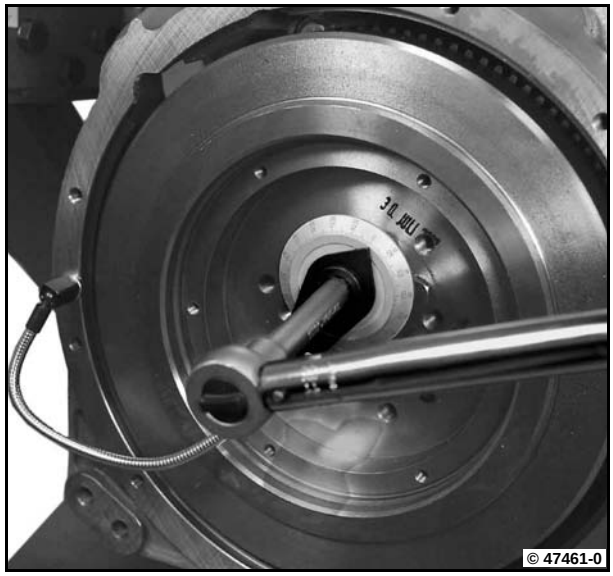
Attention!
Renew screws every time they are loosened.

- Remove self-made mandrin guide.



- Tighten screws alternately.
  - Stage 1:
    30 Nm
  - Stage 2:
    60°
  - Stage 3:
    30°

Block flywheel with suitable tool.



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A12 001	Flywheel on crankshaft		Stage 1: Use new screws	30 Nm
A12 001	Flywheel on crankshaft		Stage 2:	60°
A12 001	Flywheel on crankshaft		Stage 3:	30°

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

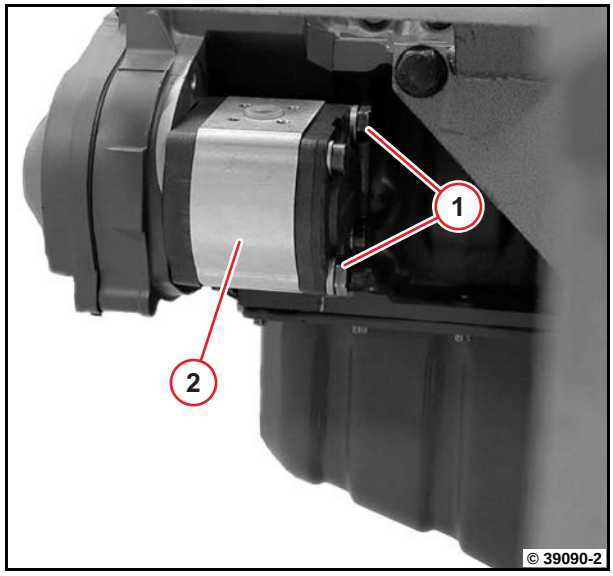
Removing and installing the hydraulic pump

Commercial available tools

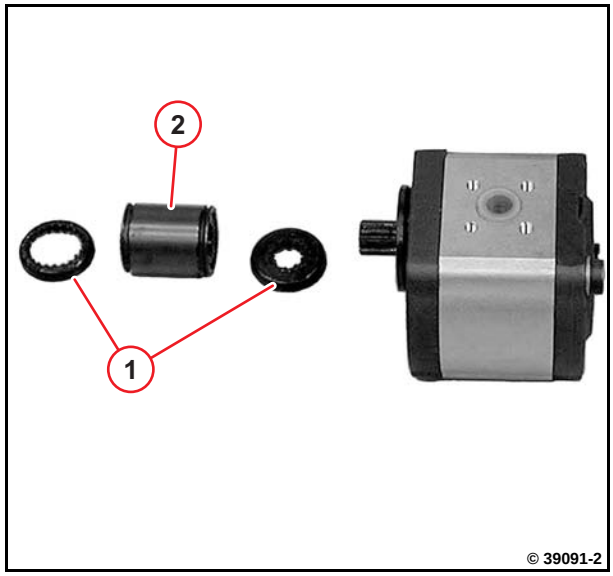
– Graphite grease G 500

Removing the hydraulic pump

- Remove the hydraulic pipes.
- Press in stoppers.
- Unscrew screws (1).
- Remove hydraulic pump (2).
- Remove coupling sleeve.

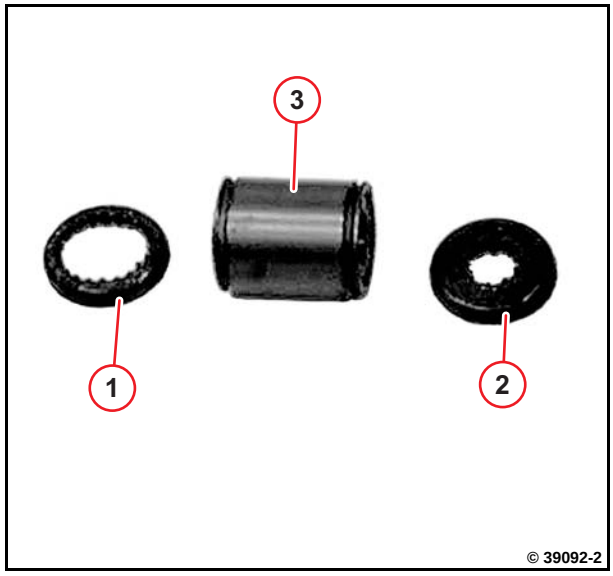


- Pull off the collars (1).
- Clean coupling sleeve (2).
- Check components for visible signs of wear.



Installing hydraulic pump

- Pull collar (1) onto coupling sleeve (3).
- Align cutting on the toothing of the coupling sleeve.
- Pull collar (2) onto coupling sleeve (3).
- Align cutting on the toothing of the coupling sleeve.
- Grease inner toothing of the coupling sleeve.



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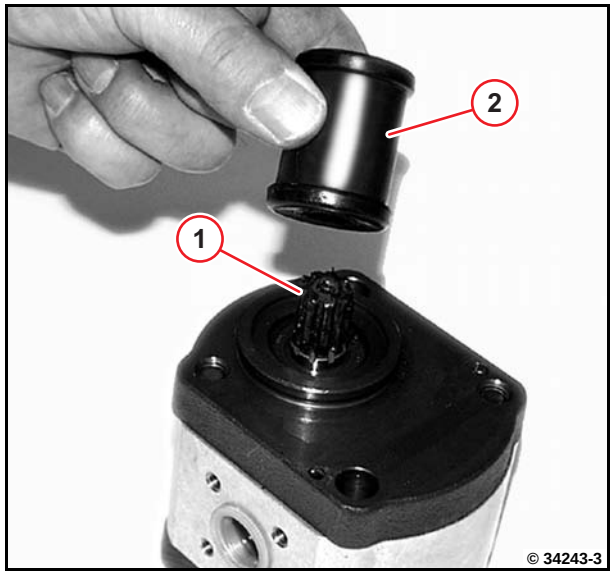
- Grease gear shaft (1).
- Push on coupling sleeve (2).

Note installation position.

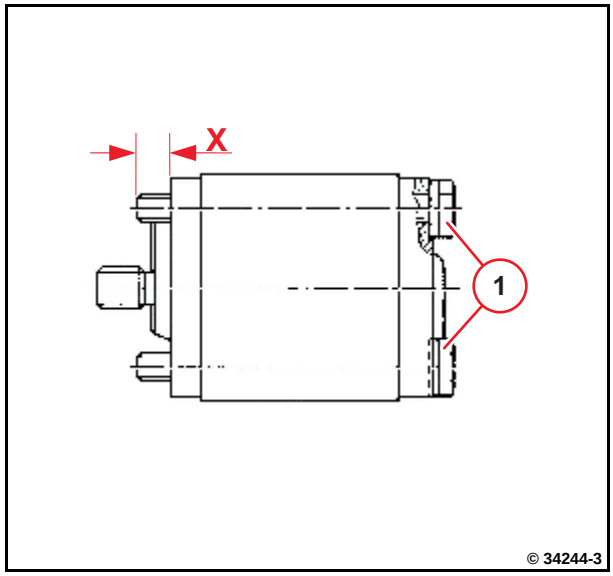
Toothing of the coupling sleeve must engage with the gear shaft.



- Insert screws (1).
- Measure protrusion dimension X.

Maximum protrusion dimension X =18 mm.

Use new screws or correct with washers under the head of the screw.



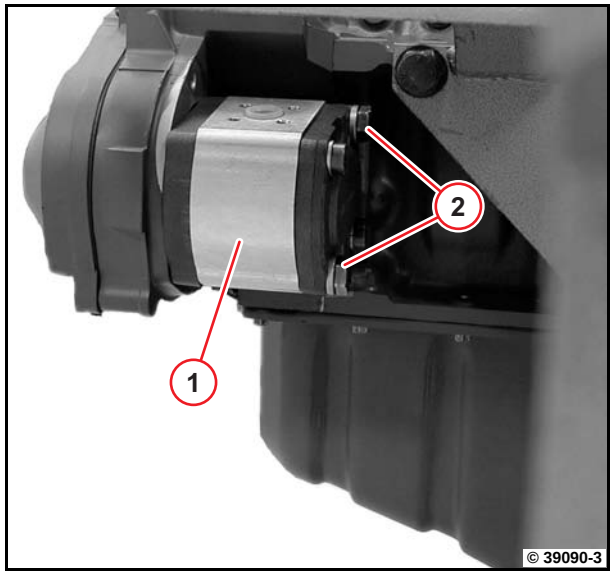
- Insert hydraulic pump (1) and coupling sleeve.

Toothing of the coupling sleeve must engage with the gear shaft.

- Tighten screws (2).

57 Nm

- Pull out stoppers.
- Insert hydraulic pipes.



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A12 051	Hydraulic pump on hydraulic pump console			57 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

Removing and installing the generator

Commercial available tools

– W 12-02-01

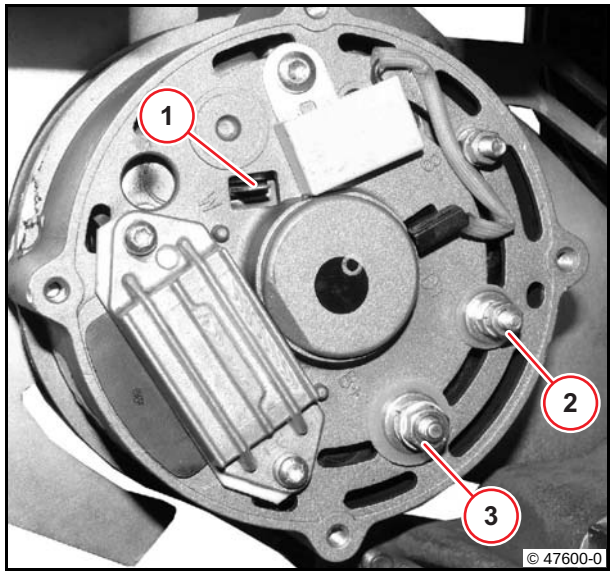
Removing the generator

- Disconnect the battery's negative terminal.
- Remove cable from generator.

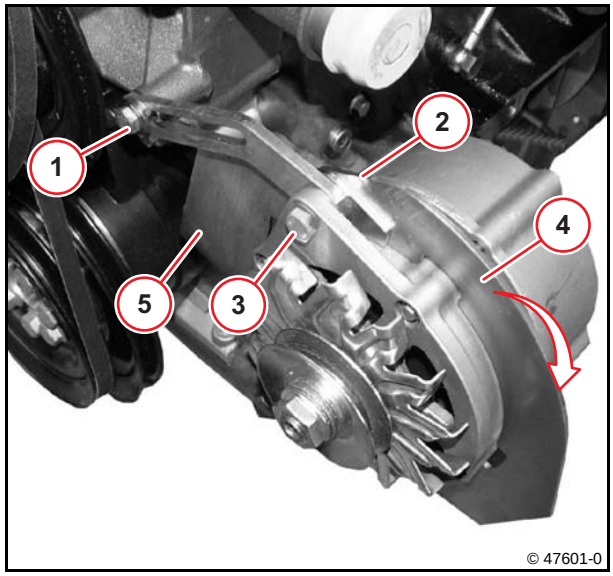
Note assignment!
- (1) = terminal W
- (2) = terminal D+
- (3) = terminal B+

- Remove V-belt.

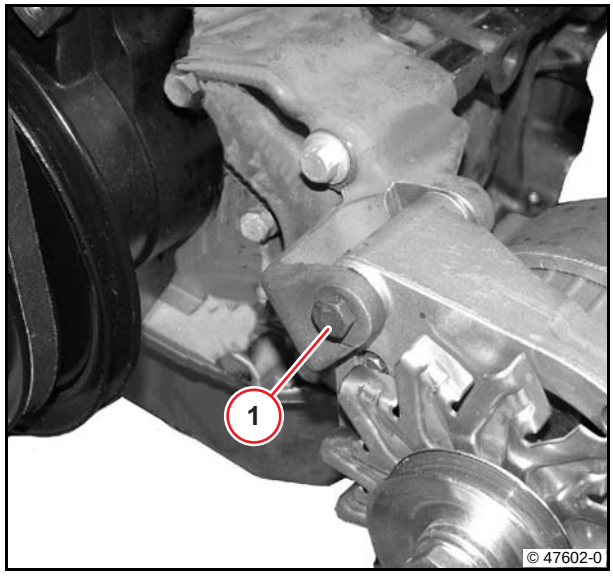
W 12-02-01



- Loosen screw (1).
- Unscrew nut (2).
- Hold screw (3).
- Remove protective plate (4).
- Remove protective plate (5).
- Remove screw (3).
- Lower generator in direction of arrow.

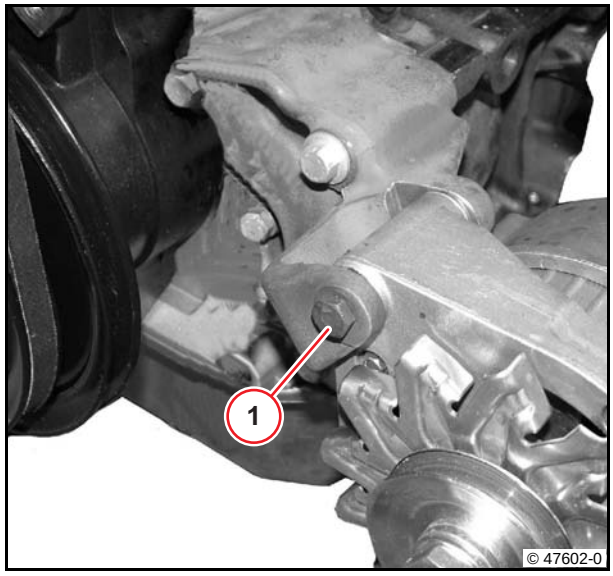


- Unscrew screw (1).
- Remove generator.

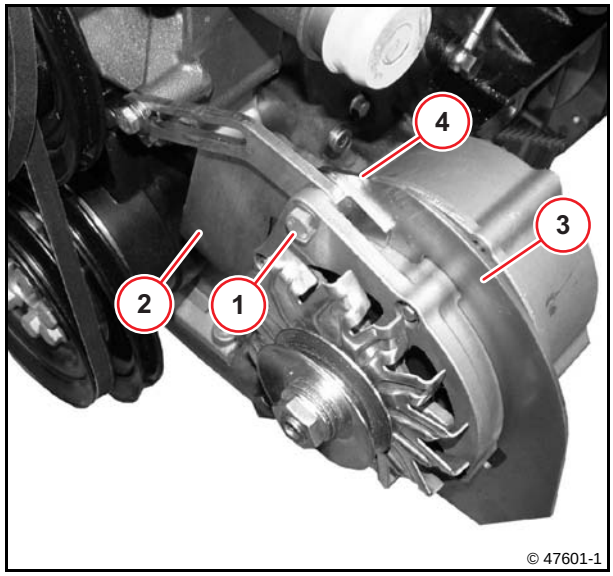


Installing the generator

- Mount generator.
- Fasten screw (1).



- Mount generator.
- Insert screw (1).
- Mount protective plate (2).
- Mount protective plate (3).
- Screw on nut (4).



- Remove cable from generator.

Note assignment!
- (1) = terminal W
- (2) = terminal D+
- (3) = terminal B+

– (Position 2)

3.5 Nm

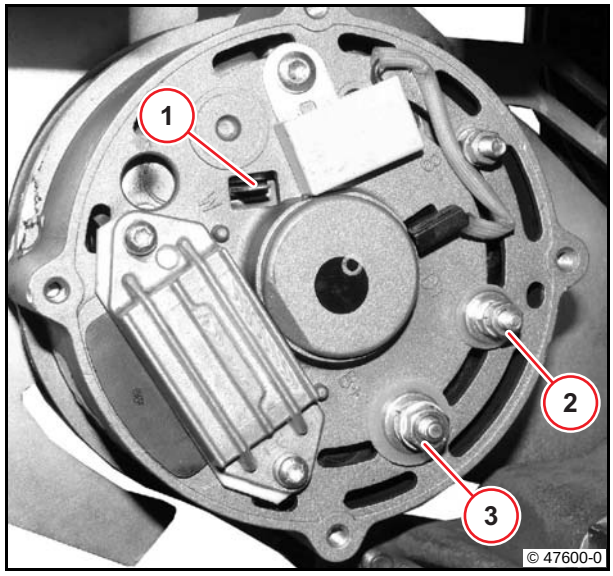
– (Position 3)

6.5 Nm

- Install V-belt.

W 12-02-01

- Connect the battery's negative terminal.



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A13 081	Charging current cable to generator B+			6.5 Nm
A13 082	Cable G1.D+ to generator	M5		3.5 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

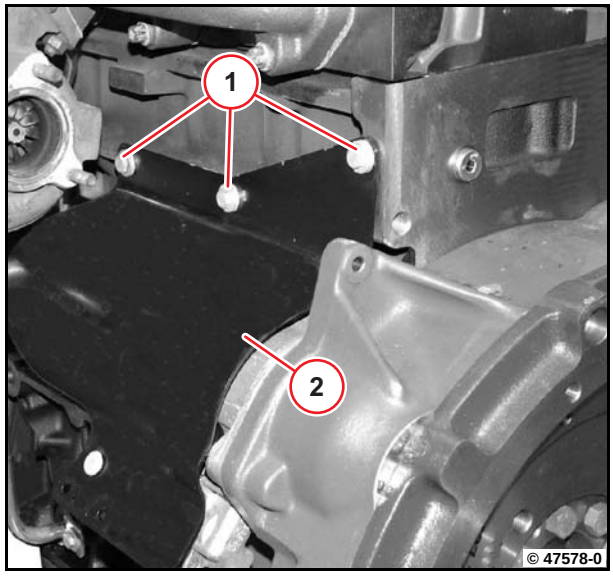
Removing and installing the starter

Commercial available tools

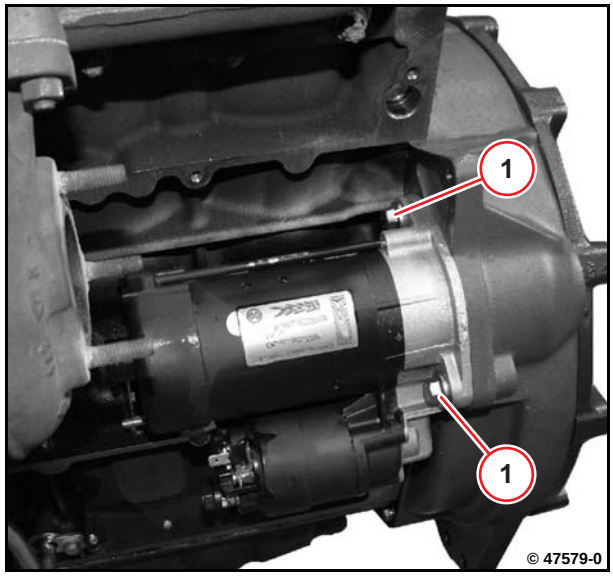
Removing the starter

– **TD 2011 w, TCD 2011 w**

- Disconnect the battery's negative terminal.
- Disconnect cables.
- Unscrew screws (1).
- Remove shielding plate (2).



- Unscrew screws (1).
- Remove starter.



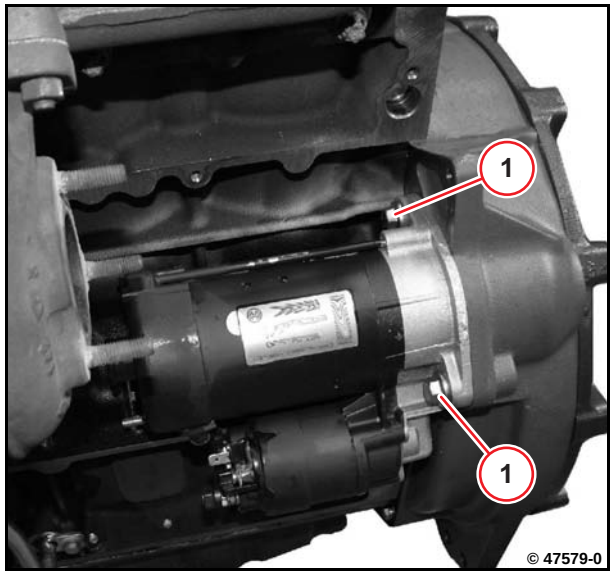
- Visually inspect the components.

6

Installing the starter

- Insert starter.
- Tighten screws (1).

43.5 Nm



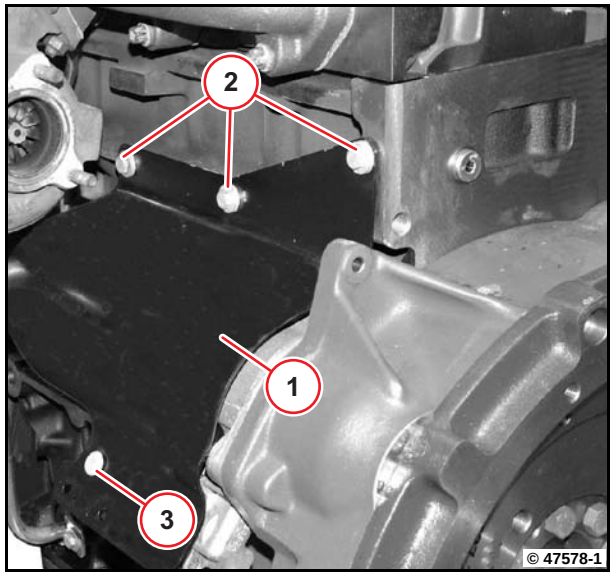
- Mount shielding plate (1).
- Tighten screws (2).

Make sure that the installation site of the rubber pad (3) is in perfect condition.

- Tighten screws (2).

8.5 Nm

- Connect cables.
  - see Technical Circular 0199-44-1163
- Connect the battery's negative terminal.



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A13 001	Starter on crankcase			43.5 Nm
A13 009	Shield on crankcase	M6x14-8.8		8.5 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

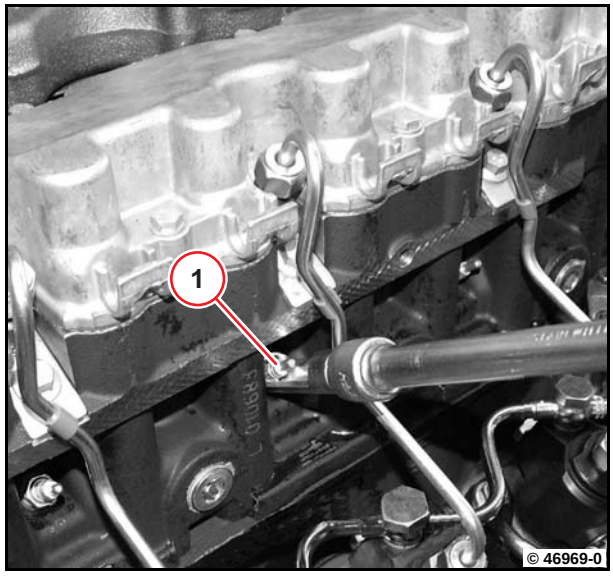
Removing and installing the heating plugs

Commercial available tools

Special tools:
– Assembly tool 120440

Removing the glow plugs

- Disconnect the battery.
- Disconnect cables from heating plugs.
- Unscrew heating plugs (1) with assembly tool.

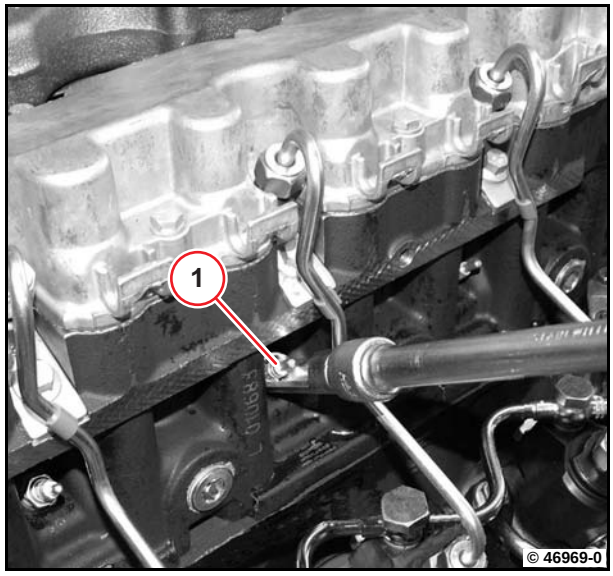


- Visually inspect the component.

Installing the glow plugs

- Screw in heating plug (1).
- Tighten heating plug (1) with assembly tool.

  21 Nm
- Connect cables to heating plugs.
- Connect the battery.



6

Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A13 032	Heating plug on cylinder head			21 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

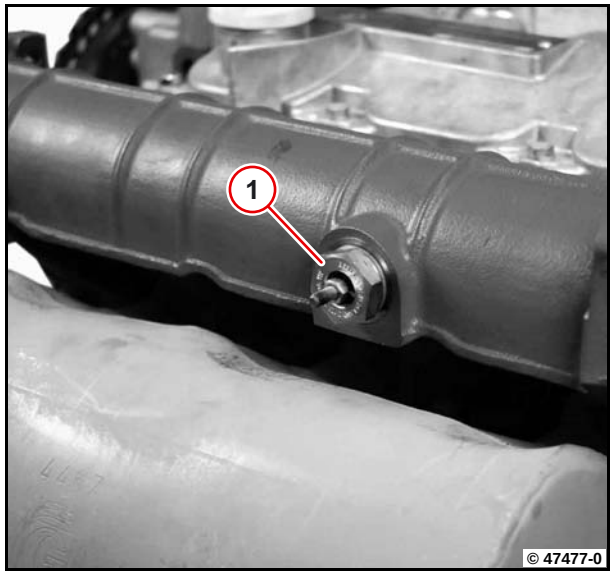
6

Removing and installing the glow plug

Commercial available tools

Removing the glow plug

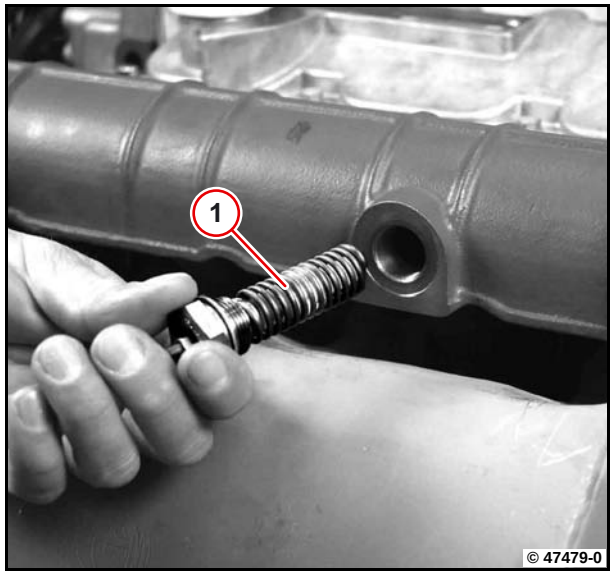
- Disconnect cable connections.
- Unscrew glow plug (1).
- Remove sealing ring.



- Visually inspect the components.

Installing the glow plug

- Insert new sealing ring.
- Insert glow plug (1).

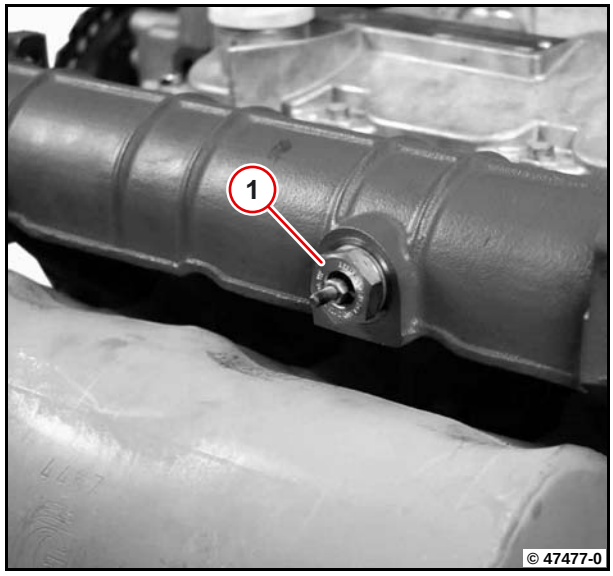


- Tighten glow plug (1).

  60 Nm

- Connect cable.

  4 Nm



Technical Data

Tightening specifications

ID no.	Name	Screw type	Notes / Remark	Value
A13 031	Glow plug in charge air line / intake pipe			60 Nm
A13 034	Cable connection to glow plug			4 Nm

For the tightening procedure according to torque using a torque wrench, a maximum variation of the tightening torque of +/- 10% is permissible.

6

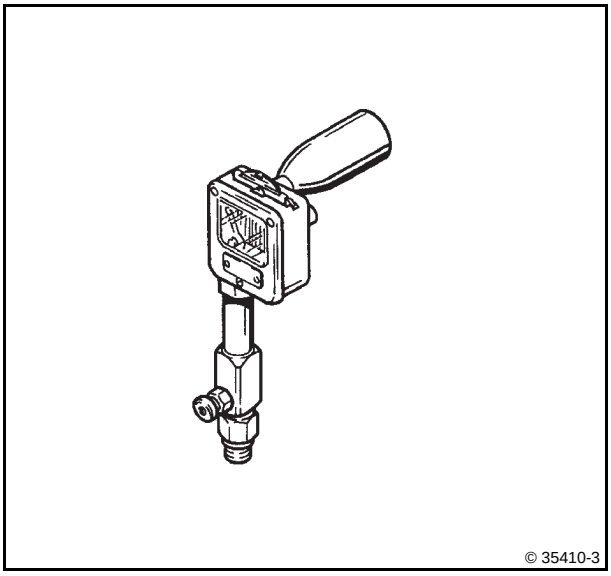
7 Standard tools

Orders

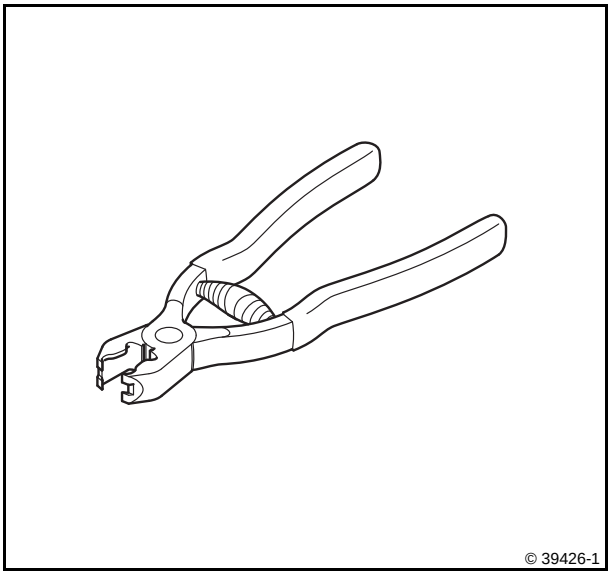
The tools can be ordered directly, stating the order number, from:

WILBAER
Wilhelm Bäcker GmbH & Co.KG
Postfach 14 05 80
42826 Remscheid
Germany
Tel.: +49 (0) 2191 9339-0
Fax: +49 (0) 2191 9339-200
E-mail: info@wilbaer.de
Web: http://www.deutz-tools.com

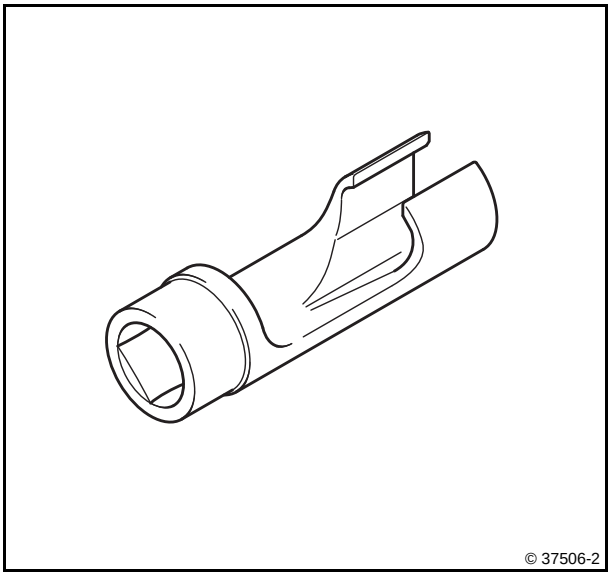
8005
Compression pressure tester
for diesel engines
10 - 40 bar
Checking compression pressure



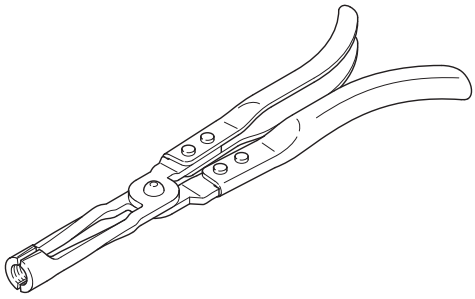
8011
Hose clip pliers
Loosen and fasten hose clips
e. g. fuel return pipe



8018
Claw wrench
Wrench size 17,
Removing and installing injection pipes



8024
Assembly pliers
Removing valve shaft seals



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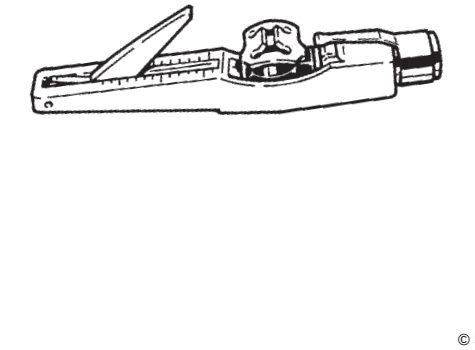
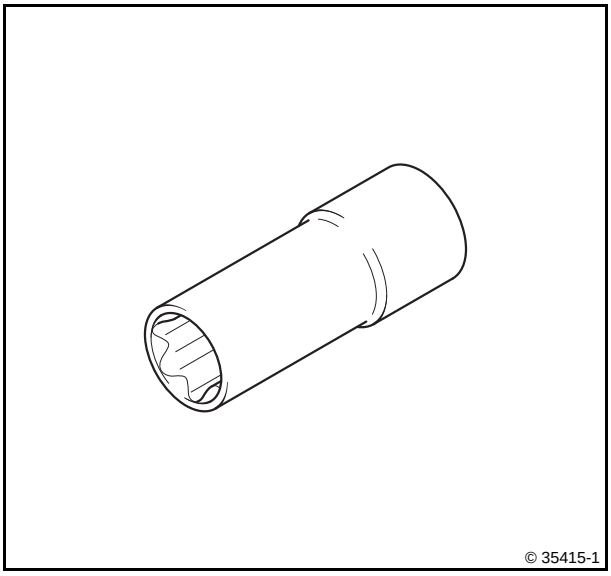
8027
Plier insert
Removing and installing the lifting magnet

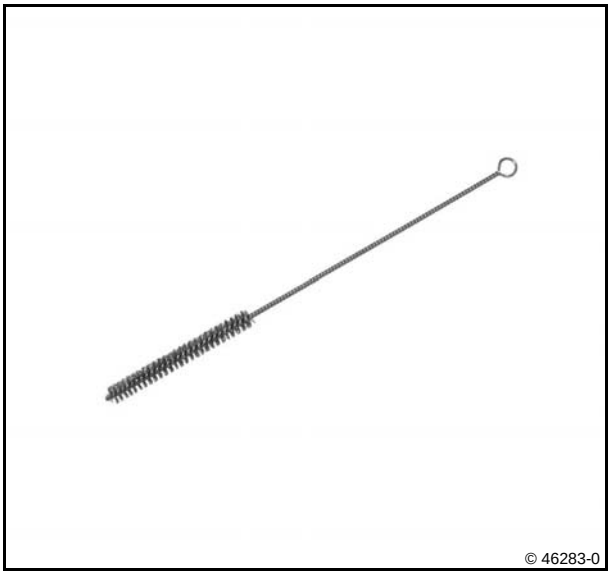
8115
V-belt tension measuring device
150 to 600 N
Check V-belt tension



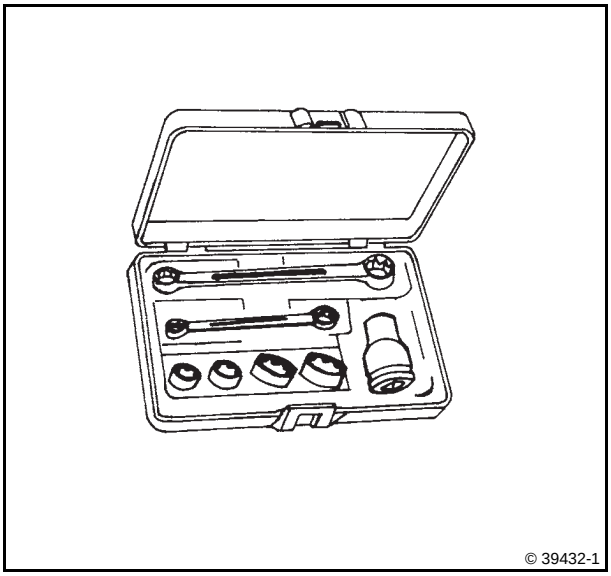
8116
Socket wrench insert
Torx - E18



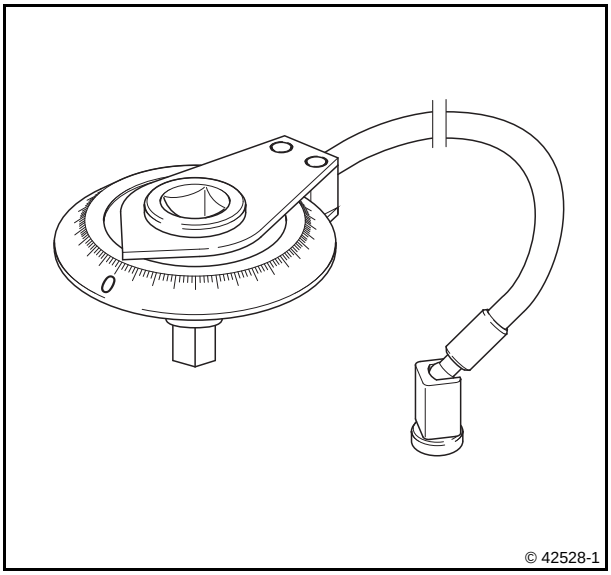
8167
Cleaning brush
Cleaning exhaust channels



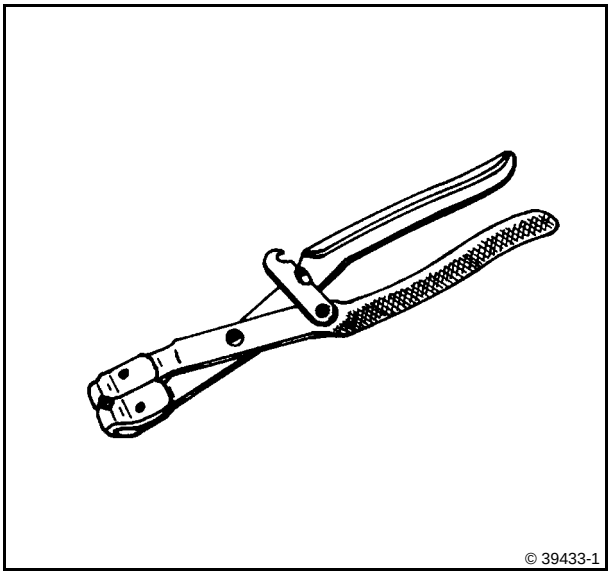
8189
Torx tool set
Contents of case:
- Double-ended ring spanner E6/E8
- Double-ended ring spanner E10/E12
Socket wrench insert E8 and E10 (1/4 inch)
- Socket wrench insert E10 and E12 (3/8 inch)
- Socket wrench insert E18 (1/2 inch)



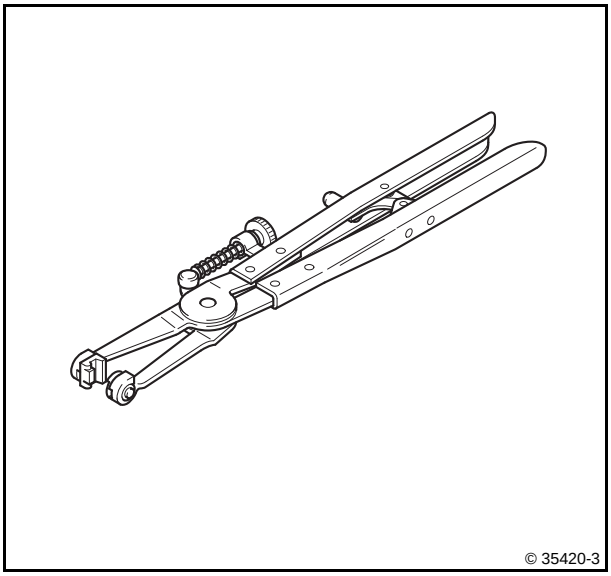
8190
Rotation angle disc
with magnet (e. g. setting valve clearance)



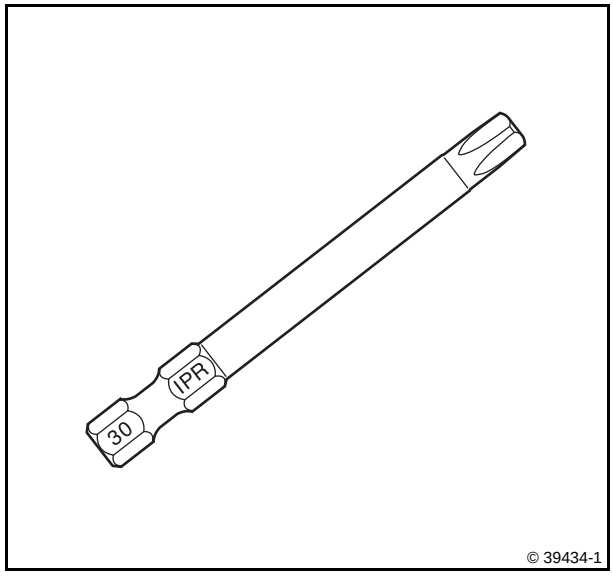
9088
Clamping tongs
Loosening and tightening hose clips



9090
Spring band pliers
320 mm
Tighten spring clamp



9120
Special bit
70 mm long



7

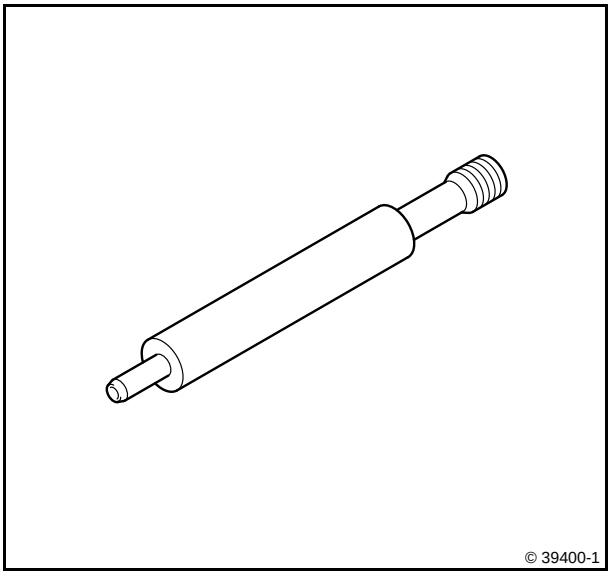
8 Special tools

Orders

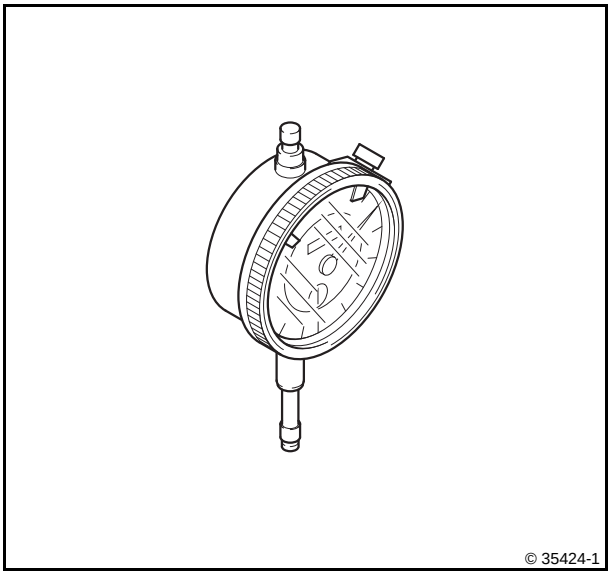
The tools can be ordered directly, stating the order number, from:

WILBAER
Wilhelm Bäcker GmbH & Co.KG
Postfach 14 05 80
42826 Remscheid
Germany
Tel.: +49 (0) 2191 9339-0
Fax: +49 (0) 2191 9339-200
E-mail: info@wilbaer.de
Web: http://www.deutz-tools.com

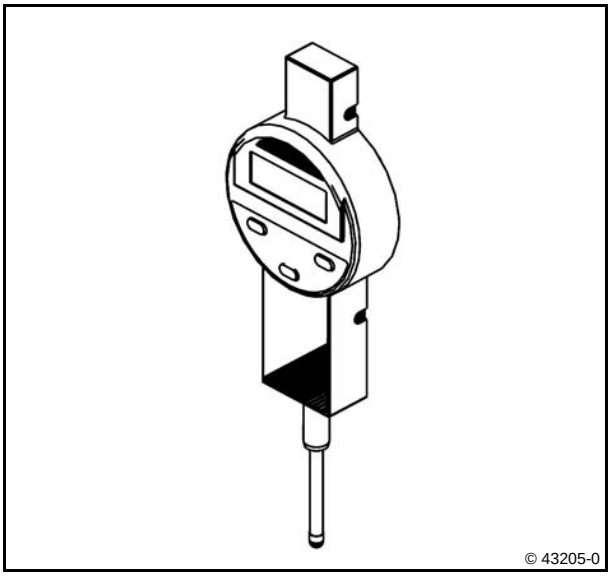
100120
Connector
(in conjunction with compression pressure tester 8005)



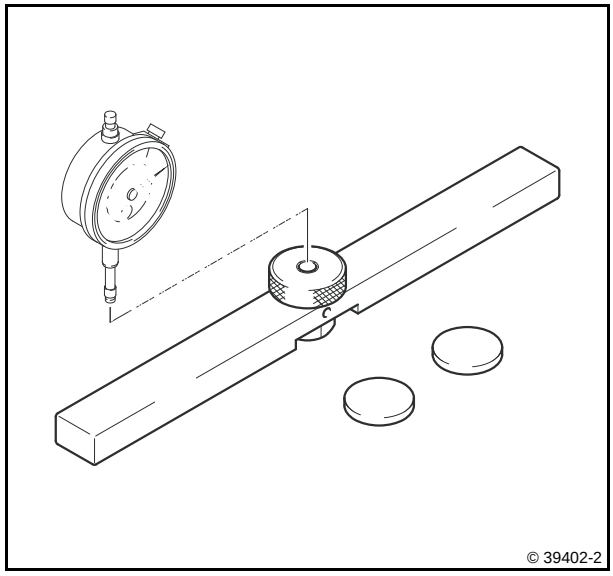
100400
Dial gauge with fixing wheel
Measuring range 0 - 10 mm / 0.01 mm



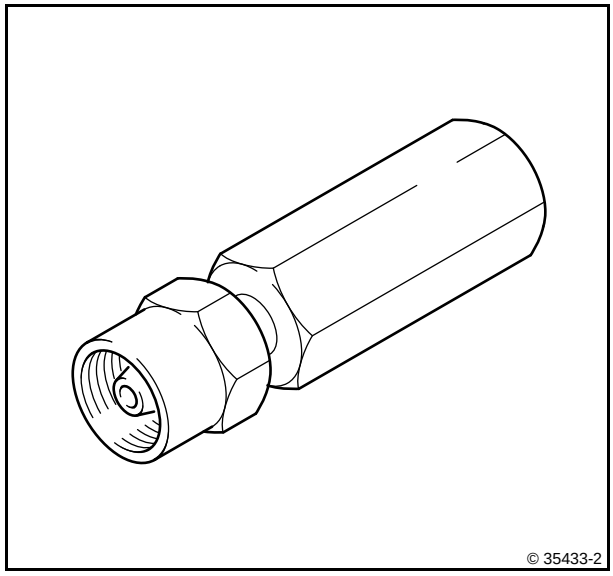
100410
Digital gauge
Measuring range 0 - 30 mm / 0.01 mm



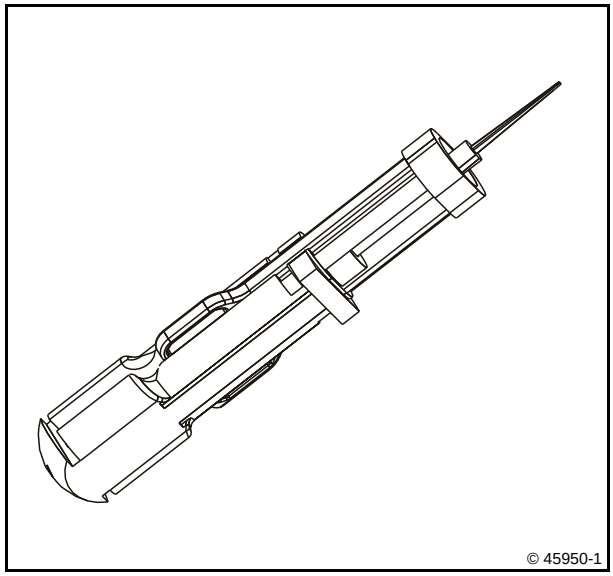
100750
Measuring device
Measuring bar with two shims
(in conjunction with 100400 and 100410)
Checking valve lag dimension
Checking piston projection



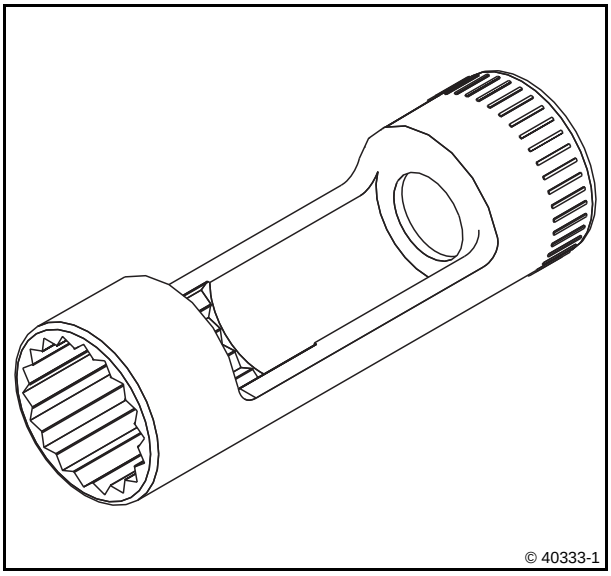
110090
Puller
(in connection with sliding hammer 150800)
Removing fuel injector



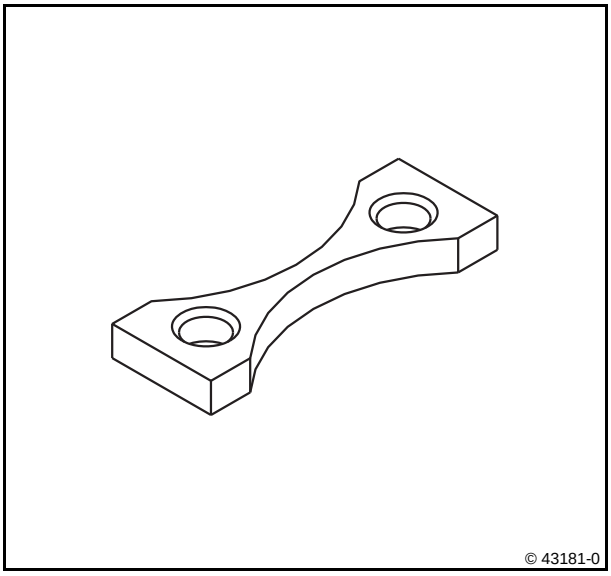
110901
Disassembly tool
(part of assembly case 110900)
Removing and installing the O-rings



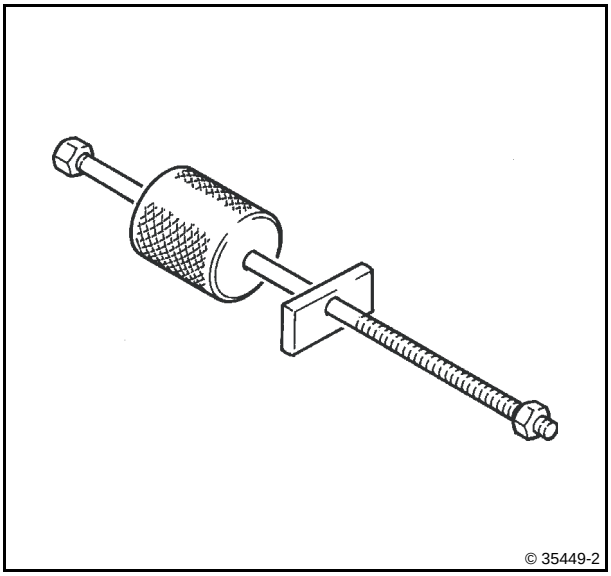
120440
Assembly tool
Removing and installing the glow plugs



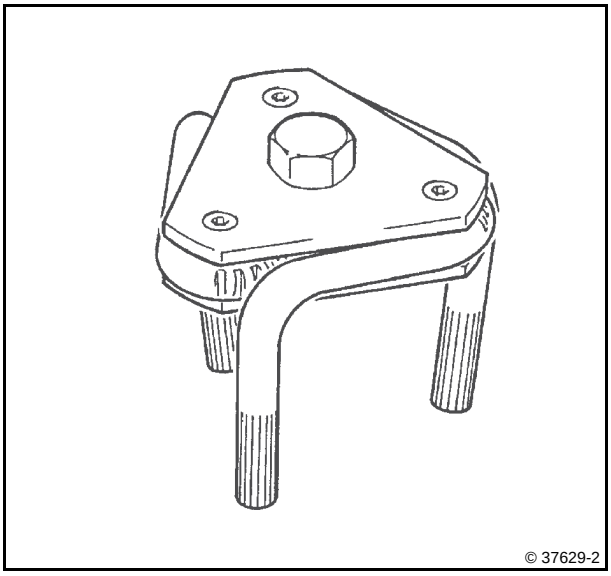
150180
Holder
(in conjunction with measuring device 100750)
Measure piston overhand on recess cylinder head



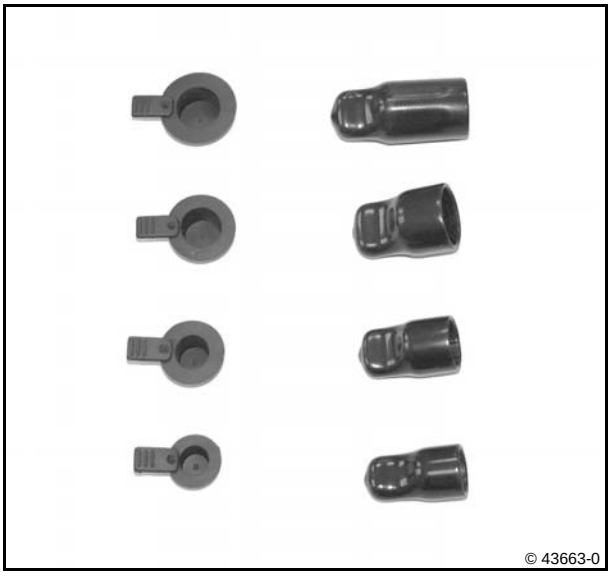
150800
Slide hammer
Removing fuel injector



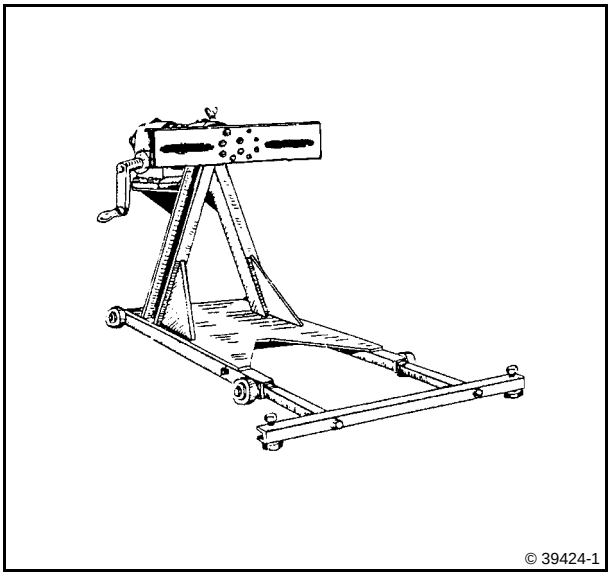
170050
Special wrench
Unscrewing the filter cartridges



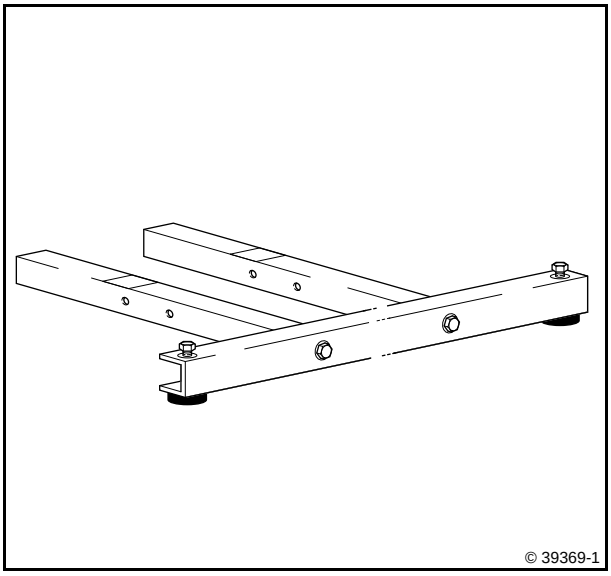
170160
Stoppers/caps
1 set of differently-sized stoppers and caps
Sealing openings on the fuel system



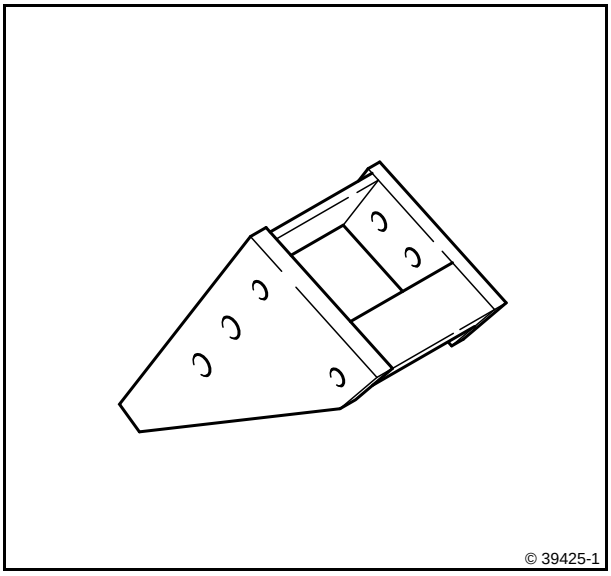
6067
Assembly block
Engine clamping, one-sided



6067/114
Supporting bracket
(in conjunction with assembly block 6067)
Engine clamping, one-sided



6067/115
Clamping bracket
(in conjunction with assembly block 6067)
Engine clamping, one-sided



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